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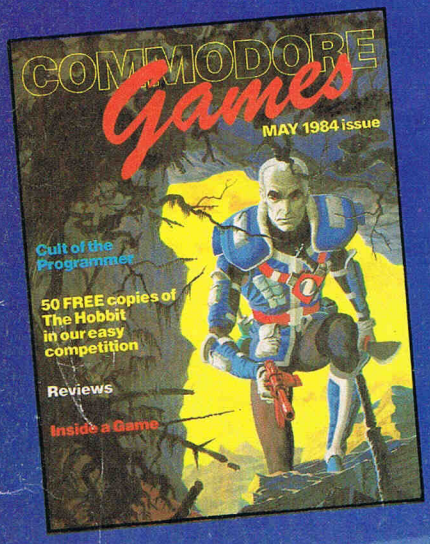
COMMODORE

COMPUTING INTERNATIONAL

The Independent Commodore Magazine

WIN
The Hobbit
in our *FREE* supplement

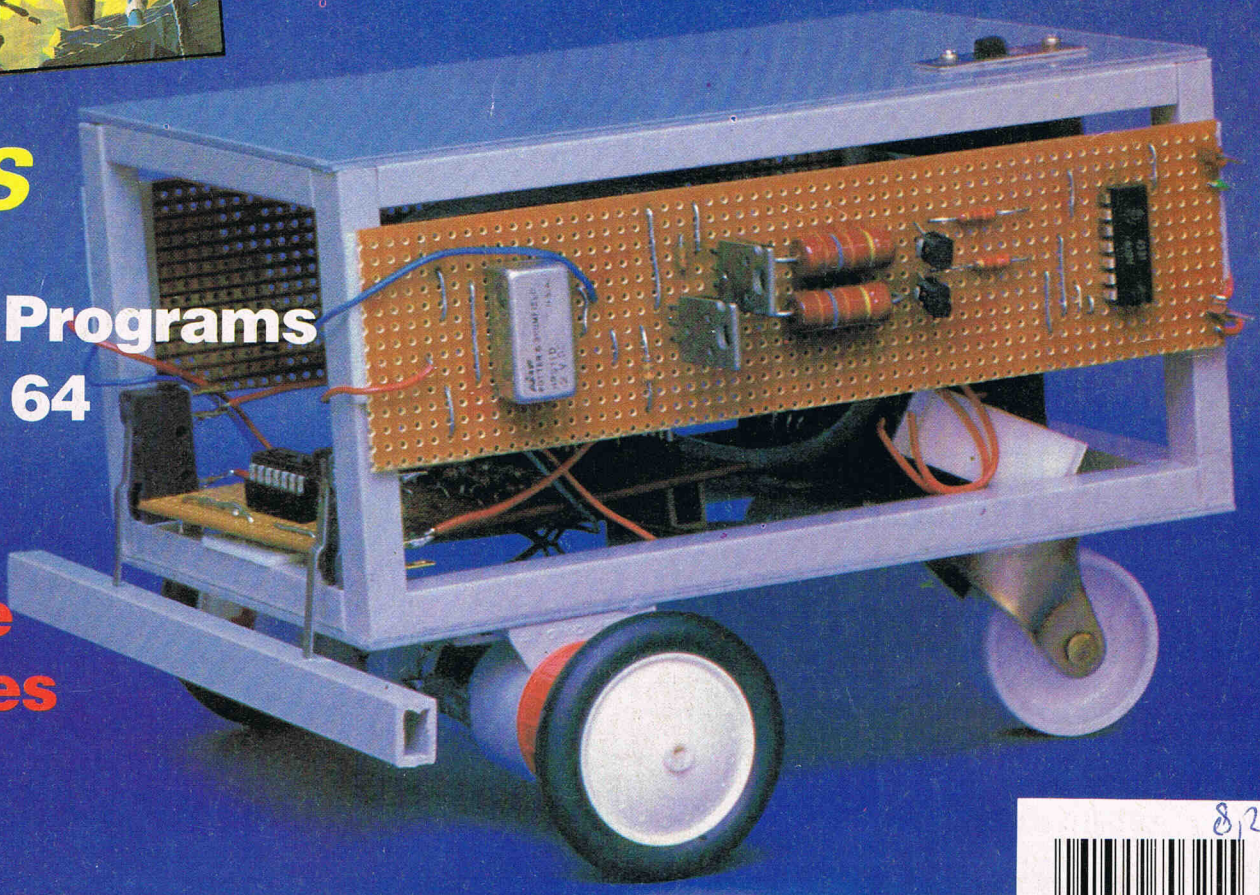


PLUS
- News
- Reviews
- Program Listings

PLUS

Music Programs on the 64

Micro Mouse Amazes



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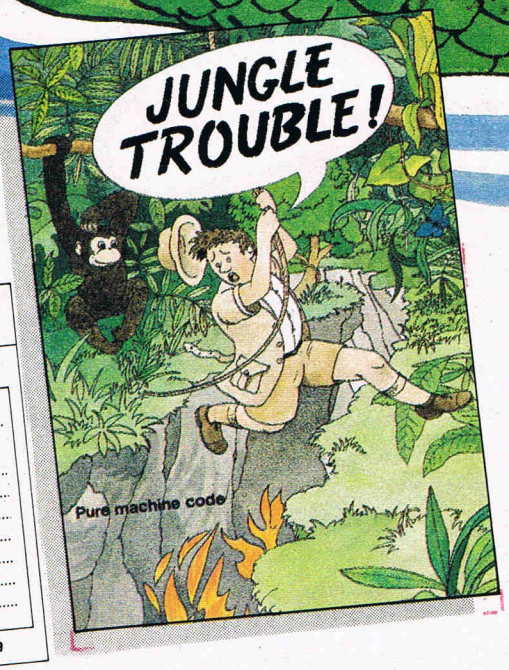
8/28

If the apes don't get you the crocodiles will!

Our intrepid explorer is forced to leap across rivers on stepping-stones, cut his way through trees, swing over a fire-pit and by-pass a flame-throwing dragon ...

... all the time harassed by falling coconuts, rampaging apes and ravenous crocodiles!

JUNGLE TROUBLE –
Another great quality game from the house which brought you
HARRIER ATTACK and SCUBA DIVE



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available from

W. H. SMITH • LASKYS • GREENS at DEBENHAMS • BOOTS • MARTINS • COMPUTERS FOR ALL • SPECTRUM CENTRES and many other retail outlets

or order direct from
CASTLE LODGE, CASTLE GREEN,
TAUNTON, SOMERSET. TA1.4AB

MAIL ORDER

All games £6.95 including postage and packing.

TYPE OF COMPUTER: .....

CASSETTE TITLES:

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2) .....

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COMMODORE
COMPUTING INTERNATIONAL
MAY 1984

COVER STORY

With the approach of the 1984 Euromouse competition, we offer some guidelines to building your own robot mouse

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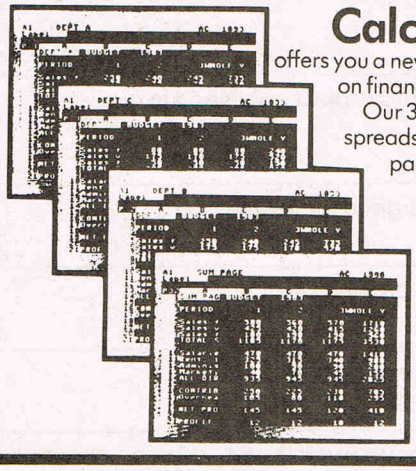
SHOW MUSIC: Some surprises for the Commodore show.

MORE MUSIC: How far have you got with our keyboard project? In our June issue we recap the project so far and show how to display your keyboard on the screen.

MORE MOUSE: The next in our series on building your own robot mouse.

Now the Commodore 64 means business

The Game's over. Wouldn't you like to increase the applications potential of your Commodore 64? Transform it from a fun family computer into a truly professional tool? Now — thanks to Handic, the world's largest creator of Commodore software — you can give a powerful new dimension to your 64's performance. We have pioneered a new program called CALC RESULT that dramatically expands the financial planning potential of your Commodore.
Doctors, Dentists, Lawyers, Bankers, Brokers and other money managers exploit it to keep track of complex client accounts. Builders, Garage Owners, Retailers of all sizes, and descriptions now use the spread sheet formula for instant feedback and analysis of trading results.
In a world where ease of access and speed of assessment are essential, CALC RESULT gives everyone the power to harness the untapped potential of their Commodore.
CALC RESULT is versatile... use it to calculate loan and mortgage payments, forecast budgets, balance cash flow, monitor stocks and shares, plan personal and corporate taxation, check expenses, log and analyse all kinds of bills.
CALC RESULT instantly translates figures into multi-coloured bar charts. It has a built-in 'HELP' function and is absolutely accident proof.



Calc Result

offers you a new perspective on financial planning. Our 3-dimensional spreadsheet sums up pages of figures in one easily understood financial model.

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All functions in **Calc Result Easy** plus 32 pages (Three-dimensional viewing). Page add, window, split-screen (up to four pages on the screen at the same time), and help functions.
Delivered on plug-in cartridge plus disk. Requires disk drive.

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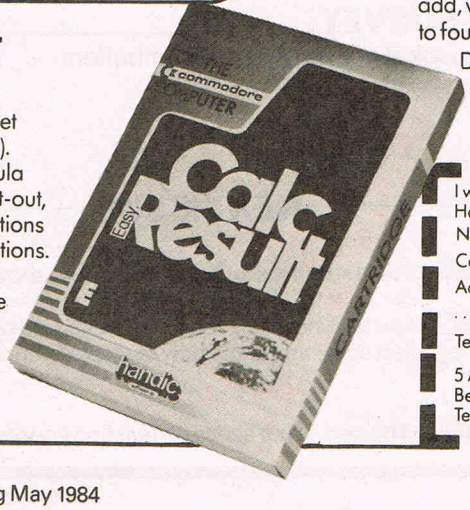
Single page spreadsheet (64 columns x 254 rows). Built-in graphics. Formula protection, flexible print-out, colour conditional functions and mathematical functions. Delivered on plug-in cartridge. Data storage on cassette or disk.



For more information contact our Advisory Centre on 0344-778800 or simply contact your local Commodore or Lightning dealer, or clip the coupon.

I would like you to send by return post further information on the Handic 64 range. CC2

Name ..... Title .....

Company .....

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5 Albert Road, Crowthorne
Berkshire, RG11 7LT
Tel: 0344 778800 Telex: 849426

handic software Ltd
Thinking ahead

Ping-Pong

Robots already look set to take over all our manual labour, but now it seems that they are about to take over our leisure as well! A Ping-Pong (table tennis) competition has been announced, not for humans but robots.

The Steering Committee of the International Personal Robot Congress and Exposition (IPRC) have accepted a British challenge for the tournament which is to take place in 1986.

Dr John Billingsley of Portsmouth Polytechnic conceived the idea and contest organisers believe that the sensor technology enabling robots to 'see' the ball and then return it to their opponents will become available in the next two years. It is also expected that most of the 'competitors' will be built by enterprising individuals rather than by large manufacturers.

Trials for the selection of the American team will take place at IPRC '85.

A special scaled-down version of a Ping-Pong table has been designed for the competition, with a frame at either end. Above the net is another 50cm square frame to outlaw the unsportsrobotlike practice of lobbing the ball out of view of the opponents sensors!

For information on the IPRC **contact:** IPRC, 777 Locust Street, Denver, Colorado 80220.

For information on the contest itself **contact:** Dr John Billingsley, Dept of Electrical and Electronic Engineering, Portsmouth Polytechnic, Anglesea Road, Portsmouth.

Housing

Advances in Microtechnology, particularly in microelectronics, are having considerable effects on the design of homes. The number of people working from home has risen dramatically in the last few years and few homes are built to encourage working activity.

In the last decade public and private housing have been at least 10% smaller in area than in the '60s and the Housing Associations Charitable Trust are concerned that everyone in the Housing Industry should realise that there will have to be changes in housing designs in the UK.

Concept

Lion House, a new computer retail centre is launching a new concept in selling micros to the business and home markets. The redecoration of their Tottenham Court Road premises is just being completed and it will be renamed Micro Systems.

Spread over five floors, Lion plan to have several different sections including departments concentrating on hardware and accessories for the home market; business systems; an advisory centre for first time buyers; a fifty seat lecture theatre for seminars and training and a press centre with free database and word processing facilities.

Contact: Lion House, 227 Tottenham Court Road, London W1P 0HX. Tel: 01-580 7383.

In the Pipeline

Marshall Smith, the new president of Commodore has been planning some interesting moves since he took over from Jack Tramiel. Commodore have signed a technology licensing agreement with the manufacturers of Hyperion, a IBM compatible machine and by the end of this year Commodore are hoping to have their own IBM compatible machine in production.

CBM packages

Commodore are trying to consolidate their position in the microcomputer business market by offering five packages with considerable price reductions to cover every size of business.

Each package includes hardware, software and peripherals necessary to satisfy the demands of most businesses. The five packages available are as follows:

A 700B computer and monitor, SFD 1001 single disk drive, 4023 printer, cables and three software packages (Superscript word processing systems, Superbase filing system and Calc Result spreadsheets) reduced from £2,713 to £1,495.

A 700B computer and monitor, SFD 1001 single disk drive, 6400 printer plus cables and three software packages (Superscript, Superbase and Calc Result) reduced from £3,363 to £1,995. A 7105B computer with integral monitor, 8250 dual disk drive, 4023 printer, cables and three software packages (Superbase and Calc Result) reduced from £3,204 to £1,975.

A 710B computer with integral monitor, 8250 dual disk drive, 1361 printer, cables and three software packages (Superscript, Superbase and Calc Result) reduced from £3,484 to £1,995.

A 710B computer with integral monitor, 8250 dual disk drive, 6400 printer, cables and three software packages (Superscript, Superbase and Calc Result) reduced from £3,854 to £2,495.

Contact: Commodore Information Centre, 675 Ajax Avenue, Slough. Berkshire SL1 4BG. Tel: 0753 79292.

Welcome

Kenneth Baker MP, Minister of State for Industry and Information Technology, recently welcomed Commodore's decision to open a factory in Corby. He said: "Regional financial incentives have been used in a constructive way to help this project go ahead in Britain and bring the benefits of a significant number of new jobs for Corby and a welcome addition to our growing information technology related industries."

Commodore's Corby factory is Europe's largest microcomputer factory, creating 600 jobs this year with an additional 400 jobs being generated as the factory gears up production.

Production commences in September. The factory will initially produce 200,000 microcomputers a month and has the expansion capacity to produce over 350,000 units a month. Two-thirds of production will be exported to Europe and countries such as Australia and the Middle East.

Talk

A two-day conference discussing how to avoid losses through piracy is being organised by Business Research International. It will take place at the Park Lane Hotel, London on June 4-5.

Subjects on the agenda include: specific steps you can take to combat piracy; what your rights are in law; when to use litigation – a cost/benefit analysis; why protection should be treated as an investment; the latest technology available to protect your programs; how proposed changes in legislation will affect your position; what new protection problems may be created by knowledge based systems; plus two case studies.

The cost of this conference is £396.75, with a 10% reduction if two or more delegates attend.

Contact: Business Research International, 57/61 Mortimer Street, London W1N 7TD. Tel: 01-637 4383.

64 hardware

Product		OUR PRICE
(a)	Commodore 64	£195
(b)	1530 cassette unit	£ 45
(c)	1541 disk unit	£199
(d)	SX64 + £250 software	£850
(e)	MPS801 printer	£199
(f)	1526 printer	£310
(g)	Epson FX80	£400

Product		OUR PRICE
(h)	Epson RX80	£275
(i)	1701 monitor	£210
(j)	parallel interface to link 64 to (g)	£ 25
(k)	interface to convert any cassette recorder to 64/Vic20 use	£15

Product		OUR PRICE
(n)	package (a) + (b)	£230
(o)	package (a) + (c)	£387
(p)	package (a) + (c) + (e) + Easy Script, Easy File and Intro to Basic (all on disk)	£620

(Offers subject to Commodore supply)

Prices include VAT. Carriage is free except on credit orders. A full range of hardware and software is available by mail from us. Ask for prices and details. Alternatively, visit The DGH Software Centre's new shop at 10 North Street, Ashford, opening end of May. A full range of books also available by mail order at normal retail price plus £1 p&p.

VISA Access

ACCESS/VISA credit card hot-line:

(0227) 266289

If answering machine is in use be prepared to state program name, your credit card number and expiry date, your address and telephone number.

software selection

This is a selection of some of the best programs for the Commodore 64 from a list of over 800 we can supply, covering the products of 100+ software houses from the UK, rest of Europe and the USA. A 20-page listing and later updates are available free to customers (otherwise 50p and large SAE. Add 50p p&p for orders under £20. (Europe £1 on each item of software).

Please note that the prefix (d) before a price denotes that the program is available on disk (for example d25). The prefix (r) (as in r29) indicates that the program is in cartridge form and costs £29.00. Tape program prices have no prefix. Thus (d29) indicates a disk version at £29.00 and a tape version at £16.00.

WORD PROCESSING

PAPERCLIP (d90) is the most sophisticated and versatile wp program for the 64. Very good too is **VIZAWRITE** (r78 d65) which also has a spell-check program **VIZASPELL** (d20 if bought with VIZAWRITE, else d65). But for casual wordprocessing of extreme sophistication we recommend **HOMEWORD** (d35) which is outstanding value and very easy to master. It uses 'icons' to symbolize menu options (as used by Lisa). Contains several really innovative features. Much further down the scale but ideal as a low cost text editor is **WORD WIZARD** (5.99). Compatible labelling programs are available.

UTILITIES

DISKEY (d36) is a really powerful disk editor which enables you to manipulate fully your 1541 and files produced on it. **PROGRAMMER'S UTILITIES** (d14.99) surely represents the best value if you have a disk: sprite, character, and sound editors are provided in addition to a PET emulator, and disk copy utilities – a dozen in all! **COMPACTOR** (d10.50 8.50) cuts out all wasteful programming including REMs and spaces. This can speed up programs and salvage memory. Various good quality sprite and character editors are available including **SUPERFONT 4.0** (6.75) **SPRITE/GRAPHICS EDITOR** (5.99) **SPRITEMAKER 64** (6.75). On the music side there's **MUSIC COMPOSER** (r9.99) **ULTISYNTH** (14.95) and **SYNTHESOUND** (r25 d25). If you have a lot of tape-based software, **DISCO** (c9.95) can be used to transfer much of it to disk – this is a truly powerful utility which is the best of its type. **KOALAPAD** (75) is an outstanding hardware accessory which enables you or your children to create wonderful screen pictures which can be saved and displayed independently – requires **KPAINT** (d20). Other 'pad' software also available.

PROGRAMMING AIDS

These range from improvements to C64 BASIC to actual programming aids. **SIMONS BASIC** (r50) adds 114 extra commands and facilities, and the rather better planned program **BC BASIC** (r50 17.95) does much the same. Best of the compilers and excellent value is **PETSPEED** (d50). On the machine code front there are numerous monitors and assemblers the best of which is **MIKRO ASSEMBLER** (r53) but **MONITOR** (r29.95) **ASSEMBLER 64** (6.75) **ASSEMBLER DEVELOPMENT** d24.95) **HESMON 64** (r29) **MASTERCODE ASSEMBLER** (14.95) can all be recommended. If you want to learn about machine code programming we suggest **ASSEMBLER TUTOR** (d29.95 29.95) or Honeyfold's **BEGINNER'S ASSEMBLY LANGUAGE PROGRAMMING** (14.95) If you plan writing your own database programs highly recommended are **CODEWRITER** (d85) and **THE LAST ONE** (d97) which both produce stand-alone code.

DATAFILES/DATABASES

Unquestionably the one program to have if you can afford it is **SUPERBASE 64** (d88) which we have on special offer by way of encouragement! This is a sophisticated programmable relational database. Think of what you would like your database program to do – and SUPERBASE will probably be able to do it! Very, very powerful and very, very versatile. **INFODISK** (d73) and **DELPHI'S ORACLE** (d90) are very similar and offer larger individual records but more restricted programming constraints. Multifunction database/wordprocessors include the excellent **MAGPIE** 64 (r95) **INFOMAST** (d90) and **VIZASTAR** (d99). All these programs are capable of serious disk-orientated business applications. **DIARY 64** (r30) is a really excellent 'single page' datafile for tape or disk records.

FINANCE & BUSINESS

CALCRESULT (d95) is a very sophisticated 3D spreadsheet we highly recommend for serious business uses. **PRACTICALC** (d40 35) is very good value. Also: **FUTURE FINANCE** (d75) and **BUSICALC 2** (d79 77). For home accounts there's **BANK MANAGER** (d10 7.50) **HOUSEHOLD FINANCE** (21) **MONEY MANAGER** (9.99) the very sophisticated **HOME ACCOUNTANT** (d52.50) **TIME & MONEY MANAGER** (d49). Business account programs are available also. These usually form part of a suite of related business programs. For a low cost example **BUSCOM-1, BUSCOM-2, BUSCOM-3** and **BUSCOM-4** are for monthly accounts, wages, retail accounts, and stock system respectively (all d21 19 – demonstration versions at d4.50 2.50 each). Expensive and sophisticated alternatives are also available. For VAT record-keeping and a full audit trail we unreservedly recommend **MICRO SIMPLEX 64** (d175). A very professional program with full product support. Suits Schemes A to F. Demo available.

RECREATIONAL

We can supply any of the popular games from established software houses and this includes an unbeatable selection of imported material. If there's a program for the 64 ... we can usually provide it! Look out for ALICE IN WONDERLAND (d27) and the definitive C64 **FLIGHT SIMULATOR II** (d35). Really good imports include **BLUE MAX** (d29 29) which has truly outstanding graphics and diagonal scrolling like **ZAXXON** (d29 29) which is at last available. There's also **PROTECTOR II** (d25 25) **FORT APOCALYPSE** (d23 23) **PITSTOP** (r27.50) **JUMPMAN** (d27.50 27.50) and **JUMPMAN JUNIOR** (r27.50) ... but there are many others! Interested in adventuring? Highly recommended are the following: **COLOSSAL ADVENTURE, ADVENTURE QUEST, DUNGEON ADVENTURE, SNOWBALL, TIME LORDS** and **TWIN KINGDOM VALLEY** (all 9.50 each) **THE HOBBIT** (14.50), plus Infocom's **ZORK I/II/III, STARCROSS** (all d29 each) **WITNESS, DEADLINE, SUSPENDED, ENCHANTER, INFIDEL, PLANETFALL** (all d36 each). A good range of Commodore cartridge software is now available – best of these is **INTERNATIONAL SOCCER** (r9.99). **CP/M** (rd 60) gives you the benefits of the Z80 processor and a full operating system. **PILOT** (d65) is an outstanding tool and authoring language for creating educational programs with ease. **LOGO** (d39.95) also now available.

Our list includes details of EDUCATIONAL, ACCOUNTING, BUSINESS and GAMES programs not possible to itemize here. PLEASE TRY US IF YOU ARE HAVING DIFFICULTY LOCATING A PROGRAM. Please make cheques/PO's payable to the Six-Four Supplies Company.

the six-four supplies company

P.O. Box 19, Whitstable, Kent CT5 1TJ. Incorporated by The DGH Software Centre, Ashford, Kent (a division of T. Denne & Sons Ltd)

PRODUCT NEWS

Monitor range

New company Compuser are launching a range of British-made colour monitors for home users as well as small businesses.

Two medium resolution and two standard 14 inch monitors are available. The medium resolution monitors, costing £395 plus VAT, display a text width of 80 characters and feature an anti-reflection face plate to eliminate glare. They have a RGB linear input and are also available in RGB/TTL and composite versions.

The standard resolution composite monitors have two inputs, the RGB/TTL and Pal encoded composite signals with separate sound inputs and will cost £265 plus VAT. All the monitors are housed in cabinets with optional carrying handles. A number of other specialist products will follow on from the monitors later in the year.

Contact: Compuser Ltd, 27 Vulcan Way, New Addington, Croydon, Surrey CR9 0BG. Tel: 0689 46116.

Partners

W H Smith has linked up with Softeam, a major US Software distributor in a bid to capture more than 25% of the UK business software supply over the next three years.

The new partnership, now called WHS Softeam have produced a bi-monthly software catalogue which is displayed in all WH Smith stores. The catalogue costs 75p and contains descriptions of all the software and is aimed at both new and add-on users. Other functions of WHS Softeam include after sales service, advice and supply.

Contact: W H S Softeam, Warehouse and Distribution, Euston Street, Freemans Common, Aylestone Road, Leicester LE2 7SS.

Grafpad

British Micro have plans to release the Grafpad, priced at £125, later this year. The proposed package will contain a cassette and accompanying software programs which will enable you to draw your own designs or trace the outlines of maps and pictures. These can be saved on disk or cassette and copied through a printer.

It has a working area of 240 x 192mm, with a resolution of 320 x 256 pixels. A freehand drawing program, called Draw, accompanies the Grafpad and together with the detachable pen and a choice of red, green or blue, there is scope for a variety of drawings.

Contact: British Micro, Penfold Works, Imperial Way, Watford, Herts WD2 4YY. Tel: 0923 48222.

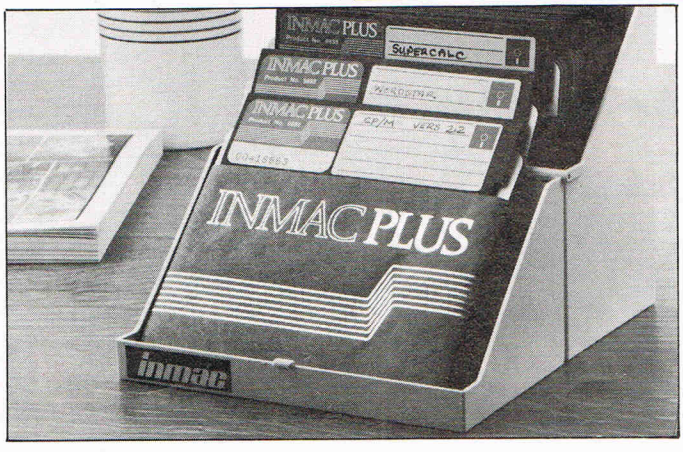
Miracle modem

The WS2000 modem for Minor Miracles costs £99.95 and will support communication systems all over the world including the American Bell system.

It conforms to the V21 and V23 CCITT standards and is switchable to the 300 baud full duplex, 1200 half duplex, 1200/75 and 75/1200 (for communication with the Prestel, Viewdata and Micronet terminals).

A plug in Auto-Dial and Auto Answer Board can be bought for £39 and a lead control set for £9.50. It has a RS232C and will need an interface to connect with the Pet, 64 or VIC 20. These can be purchased from the company.

Contact: Minor Miracles Ltd, PO Box 48, Ipswich IP4 2AB. Tel: 0473 50304.



Data storage

A floppies deskbox from Inmac will store up to 40 5¼ inch floppies in a beige plastic box costing £7.

Dividers keep the disks separate and the snap action lid is hinged so that it drops forward and provides a space for the temporary storage of disks.

Also from Inmac is a printout binder in which printouts can be filed flat for easier reference. The fixing mechanism is adjustable so that odd sized paper can be accommodated.

The binders are available in two sizes: the 132 column version costs £4.90 and will take paper up to 15⅝ inches wide and 11 inches deep; and the smaller 80 column binder, costs £4.50 and takes paper up to 9⅛ inches wide and 12 inches deep. They have blue PVC covers with a clear index pockets in the spine and inside cover.

Contact: Inmac (UK) Ltd, Davy Road, Astmoor, Runcorn, Cheshire WA7 1PZ. Tel: 09285 67551.

Shortage

Unprecedented demand and a semi conductor shortage have severely affected the availability of Epson's LQ-1500 dot matrix, letter quality printer.

Deliveries to meet the current demands will not be made until late August or September and so in the meantime Epson are supplying the printer by allocation.

Contact: Epson Printers, Dorland House, 388 High Road, Wembley, Middlesex HA9 6UH. Tel: 01-902 8892.

Compile

C P White have produced a Basic Compiler on cassette for the 64. It comes complete with a manual and costs £34.50.

The company claims that any program written in Basic will run 62 times faster if this compiler is used. It will not save the compiler with a machine code program.

Contact: C P White (Services), 54 Northfield Avenue, West Ealing, London W13 1RR.

commodore

Now with Audio Learning Cassette

Superbase 64

The natural development for Commodore 64 users

Unlock the full potential of your disk-based Commodore 64, use Superbase 64 – the complete records-handling system that puts business-style power and practicality at your fingertips.

Superbase 64 solves a host of filing problems with its easy record formatting, powerful indexing and sorting, extensive outputting options, and its 'Superbasic' programming capability.

Invoices/Finance & Banking/Membership/ Collections/Recipes/Personal Filing/Stock/ Prospects/Management Accounts/Car Fleet Records and many, many more!

And Superbase 64 comes with a simple-to-follow manual and audio-learning cassette so you'll have no trouble getting the benefits straight away.

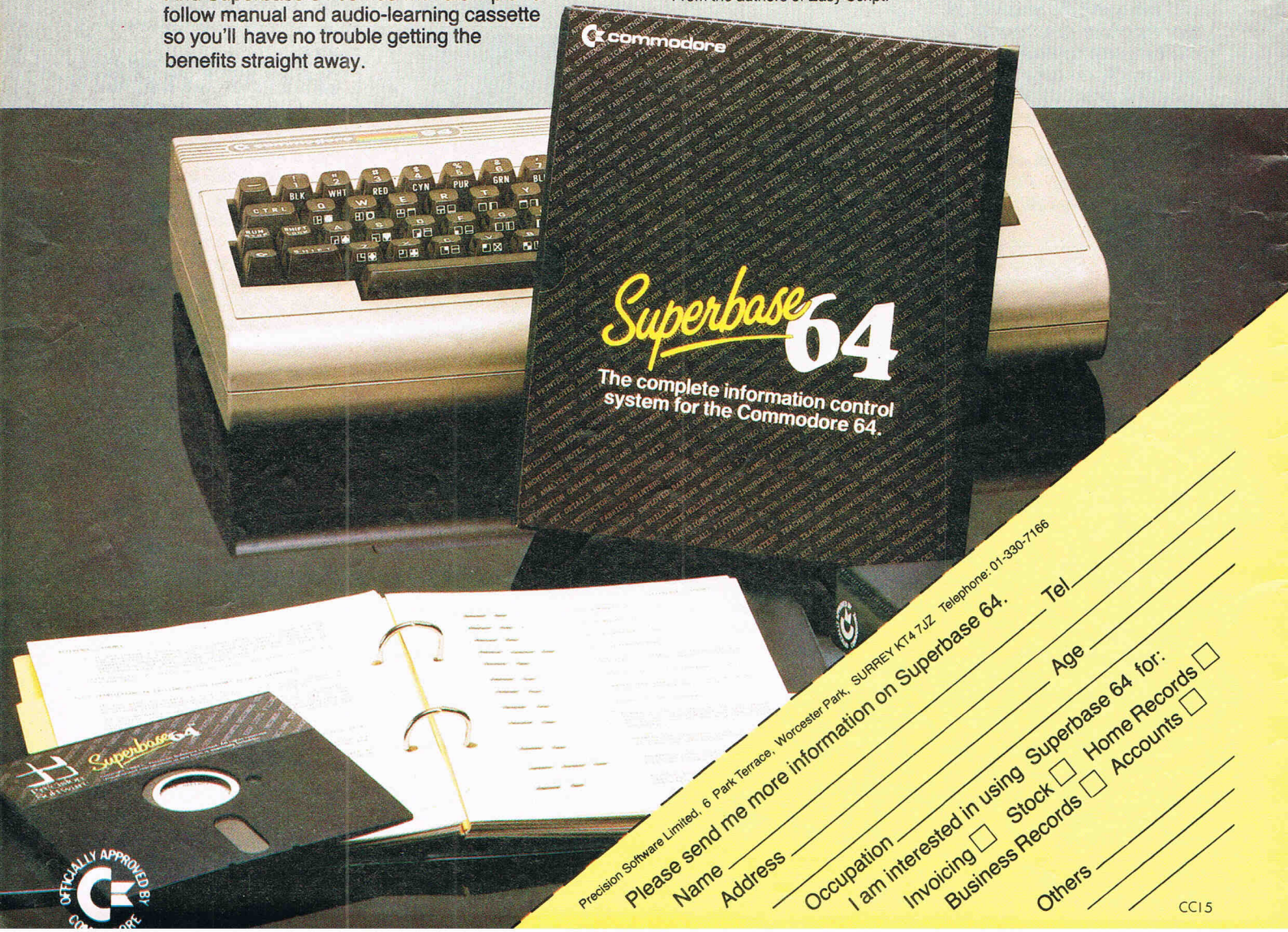
Superbase 64 – The complete information control system for the Commodore 64.

Complete your Commodore 64 – Complete the coupon

Precision Software Ltd.
6 Park Terrace, Worcester Park,
Surrey, KT4 7JZ
Telephone: 01-330 7166
Telex: 8955021 PRECIS G

More information on Superbase 64 is available from Commodore Dealers, Major Retailers or from Precision Software direct.

From the authors of Easy Script.



Precision Software Limited, 6 Park Terrace, Worcester Park, SURREY KT4 7JZ Telephone: 01-330-7166

Please send me more information on Superbase 64. Tel

Name Age

Address

Occupation

I am interested in using Superbase 64 for:

Invoicing ☐ Stock ☐ Home Records ☐

Business Records ☐ Accounts ☐

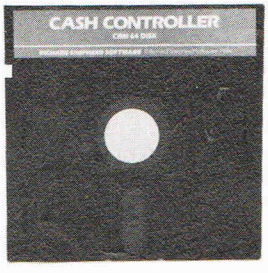
Others

CC15

RICHARD SHEPHERD SOFTWARE

A HOME BUDGETING & BANKING SYSTEM THAT REALLY MAKES YOUR COMMODORE 64 WORK!

NOW ON CBM 64 DISK AND CASSETTE



A professional style multi function Cash Controller program. In disk format you can load, and make an entry . . . or update your existing records . . . in just seconds. This easy to use program can handle up to 400 transactions, giving instant statements of your bank balance. Now there's no excuses for going into 'the red' and paying unnecessary bank charges!

BANK ACCOUNT

- Statements on demand from any date to date.
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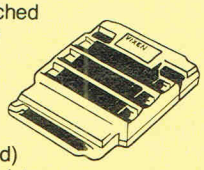

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PRODUCT NEWS

Paint pic

Paintpic, a complete colour drawing and painting program for the 64 is now available from Kuma Computers for £19.50.

Available on cassette, the program can draw in three modes – pen, brush and text and it can draw both curved and straight shapes – circles, arcs and triangles for example. Pen, bristles, borders and background colours can be set. There are a number of selectable features including eight storable brushes, graphics characters and tilted shapes.

Contact: Kuma Computers Ltd, 12 Horseshoe Park, Pangbourne RG8 7JW. Tel: 07357 4335.

Show

Walthamsoft '84, a home computer show, is being held in the main hall of Waltham Forest Technical College, Forest Road, Walthamstow, London E17 on Saturday May 19.

It opens to the public from 10am until 5pm and the admission fee will be £1. Stands exhibiting software, hardware, peripherals and allied electronics will be among the attractions. Walthamstow is easily accessible by public transport and there is ample parking space for cars.

Data 20

The Data 20 interface from Impex connects the 64 or Vic 20 to a parallel printer and costs £54.95.

It will work with printers with programmable character sets and will disable ASCII conversion. Supporting the Commodore handshaking protocol, the interface appears to the system as a 1525 printer. It generates its own power by using a small amount of energy from the signs passing to the printer from the computer.

Contact: Impex Designs (UK) Ltd, Metro House, Second Way, Wembley, Middx. HA9 0TY. Tel: 01-900 0999.

64 centre

Griceglen, a software centre specialising in products for the 64, has opened in London. It is stocking all sorts of items ranging from business applications – accounts, database systems and spreadsheets to programmers aids, books and utilities – games and educational programs.

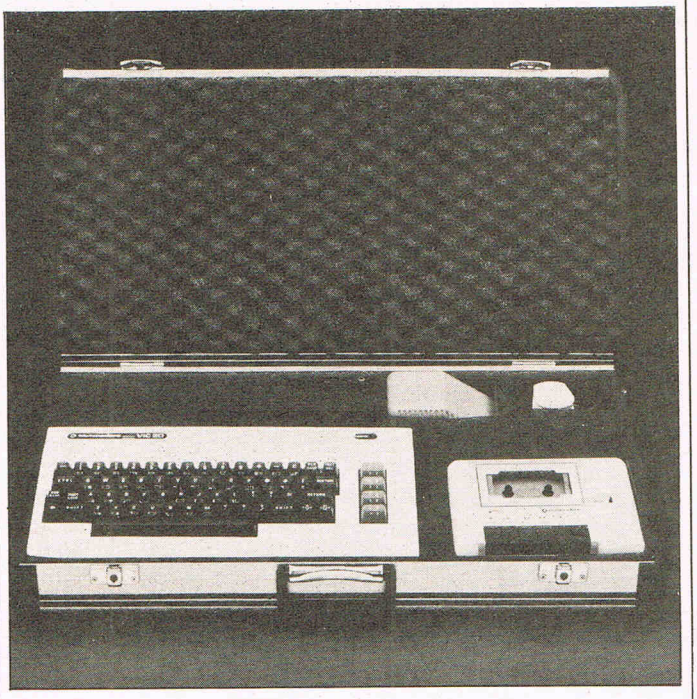
Product Demonstrations and after sales support for business customers are also available. The centre aims to keep adequate stocks up and currently have over 200 different items.

Contact: Griceglen Ltd, 26 Red Lion Square, London WC1V 4RL. Tel: 01-242 9462.

US supply

The North American division of Precision Software have signed with Commodore to supply Easy Script and Easy Spell as the standard word processing packages for the new 264 and V364 series. At present, these will only be available in North America.

Optional voice synthesis on the V364 means that commands and error messages can be spoken as well as written on the screen. There are also a number of enhancements designed to take advantage of the additional facilities on these models. Easy Spell will also feature more technical words.



Hold-all

Ever had problems transporting your 64 or VIC 20 and the various peripherals around the country? If you have, then read on because Rotronics have designed a computer case which will hold everything – the keyboard, cassette recorder, power supply, leads and even the manuals. It retails at £34.49 plus £2.50 p&p.

It weighs about 3.5Kg when empty and is about 690 x 360 x 140mm in size. Foam inserts protect the equipment, keeping it secure, and the case has black leather-look sides, aluminium extrusions and chrome-plated locks and hinges.

Contact: Rotronics Ltd, 29 Octagon Parade, High Wycombe, Bucks HP11 2HX. Tel: 0494 449623.

Programs

Handic Software have produced a number of programs which they hope will boost the commercial applications of the 64 and also a catalogue listing products available for all of the Commodore Computers.

Among the software produced is the MON 64, a Machine Code Monitor on cartridge and REL 64 which turns the 64 into a remote Command and Control Centre – activating burglar alarms, lamps, telephones, and televisions.

Contact: Handic Software, 5 Albert Road, Crowthorne, Berkshire RG11 7LT. Tel: 0344 778800.

Budgeting

Kuma Computers have at last released a 64 version of Home Budget for £9.95.

Designed to help keep track of home finances, it builds up a file of incomes and expenditures and produces tabulated reports or bar charts on these. It also has a facility to do "what if" calculations. Up to 12 categories of expenditure and three categories of income are defined and all data can be logged for date and time.

Contact: Kuma Computers, 12 Horseshoe Park, Pangbourne RG6 7JW. Tel: 07357 4335.

Twin pack

BASF are launching a twin pack of disks, providing an alternative to the traditional box of ten.

Four types of 5¼ inch disks will be offered in the new packaging: single and double-sided versions of both double density and quad density flexy-disks. A cross reference chart on the reverse will aid potential buyers to select the right disk.

Contact: BASF, 4 Fitzroy Square, London W1P 6ER. Tel: 01-388 4200.

PROJECT

Mice, mazes and micros

"Eeek! A mouse!" might not be quite the appropriate response to the mice which will be appearing at the Computer Fair although the 'chips on wheels' bumbling their way round a maze might well produce a puzzled reaction from onlookers. Here, John Billingsley, who might be regarded as the cat's whiskers of the Mouse Movement, looks at the Euromouse competition.

First, a word of explanation for the uninitiated. A micro mouse is basically a mobile chip. It's a machine that's capable of finding its way round a maze by using logic.

The Euromouse contest was first proposed just five years ago – it seems much longer. IEEE Spectrum magazine had launched its Micromouse contest in the USA; could a similar contest be used to lend light relief to the Euromicro conference planned to take place in London in September 1980?

A press announcement brought a deluge of enquiries, and the contest was on. Then the real problems started. Spectrum printed an account of a contest with a simple maze, where dumb wall-followers found the corner exit in record time. Machine intelligence was left standing. How could the Euromouse maze pose a real challenge to 'intelligent' mice?

The answer was to put the target at the centre, and to surround it with a 'moat' of passages, so that a wall-follower would merely arrive back at the start. Just in case this proved too simple, a 'cat hunt' and a 'virtuoso display' were added as extra classes.

A practice heat was organised at Portsmouth Polytechnic for July 1980. As the day approached the mice seemed to have been smitten by a plague. From 20 mice in construction their numbers shrank to ten, then seemed in danger of approaching zero. Frantic telephone calls imploring builders to bring anything that moved succeeded in gathering just five mice for the contest.

The mice were outnumbered by the Japanese delegation researching a contest of their own, and by the television crew bent on filming the marvels of robotics. One mouse was able to navigate a corner, and might perhaps have found the centre but for a defective sensor. One ricocheted from wall to wall and made progress by Brownian motion. (These were the 'home team' of Portsmouth Polytechnic final year projects). An industrial entrant representing several thousand pounds of effort could only spin on the spot – the result of a last-minute 'improvement' to an interrupt routine. Another 'big league' mouse entertained the audience guided by two switches and an embarrassed builder. A school-built entrant covered all of six inches before its wrongly connected feedback rammed it into the wall.

Despite all this the practice was enormous fun, and the greater the chaos the more the audience and the TV presenter seemed to enjoy it. Nevertheless it was with some trepidation that I looked forward to September!

The Euromicro final was a different matter. Nine mice arrived, all potential contenders for the championship (except one which refused to move). Some sported furry coats, one sang with a raucous voice, one was built from Lego bricks. A Swiss mouse had ingenious wheels of which the 'tyres' were themselves cross-pivoted wheels, allowing the mouse to move in any direction without turning.

A Finnish mouse, Midnight Sun, could play Beatles tunes and write its name. But only one mouse, a modest clattering tin contraption with mechanical paddle sensors, succeeded in reaching the centre knowing that it had arrived there. This was Nick Smith's 'Sterling Mouse', still occasionally to be seen in action to this day.

Following an Easter 'fancy' hosted by ICL's amateur computer club, the 1981 British finals were held at the Online exhibition at Wembley Conference centre. Fifteen mice now arrived from Britain alone. The BBC 'Computer Programme' series has immortalised Quester's brainless bumblings, and two new mice made their historic debuts. These were Thumper, a square machine which switched the directions of all four wheels to change direction without turning, and Thezeus.

Cardboard and balsa-wood featured largely in Thezeus' construction, with model-aircraft seros proclaiming Alan Dibley's other hobby of model gliding. A sawn-off ZX80 provided computing power, and Thezeus turned by lowering a circular plate to the floor, lifting its wheels and spinning on the spot, meanwhile using cotton strands to hoist in its thin wire sensors.

The mouse builders were a lively bunch, and attached so much attention from visitors to the show that other stands complained of the disturbance – that was the last time the Mice were invited to Online.

September 1981 found fifteen mice competing in the Palais de la Decouverte in Paris, and David Woodfield's Thumper established itself as champion. Mice could now be relied on to find the centre, and the contest was becoming transformed from a puzzle to a race. A 'first' at Paris was the participation of a school team – although their mouse arrived as a kit of parts in a carrier bag, and did not exactly cover itself in glory.

In 1982, Practical Computing's 'Computer Fair' at Earls Court played host to the mice for the British Final. Two new Thezeii arrived, to relegate Thumper to third place, whilst several promising novices made an appearance. The planned European final was to be held at the Euromicro conference in Haifa, but affairs in the Lebanon changed all that. Tampere University in Finland stepped in as hosts in the nick of time – and then won first place with Microsaurus by a margin of two seconds.

1983 became the year of the school teams. They didn't win – by a long chalk

– but their performance at the Computer fair won them sponsorship to take part in the finals in Madrid. The top mice were taking on a new shape. Steered tricycles emulating an earlier Thezeus, they concentrated on clearing corners without faltering, and the winning mouse reached the centre in just over thirty seconds. Again the winner was a Finn from Tampere.

This year's heats will again be held at the Computer Fair, the start of a trail which could lead to Japan. T5 should be unveiled by Alan Dibley, and David Woodfield threatens a successor to KnownAim, in turn much faster than Thumper. Hopefully the winner will be sponsored to the Euromicro Final in Copenhagen in August, where the European winner has been promised an expenses-paid trip to compete in Japan in 1985.

Nick Smith's original 1980 algorithm for solving the maze still holds good today, and the challenge is more one of good engineering, reliability and tolerance to disturbances than one of conundrum solving. It is a challenge which will hold good for many years to come, perhaps with an increasing schools participation. So what sort of contest can baffle the experts?

Next year will see the introduction of a Robot Ping-Pong contest. It's not as impossible as it sounds. The table is two metres long, but only half a metre wide, so the bat movement is restricted to a reasonable range. The ball must bounce once and leave the table through a frame half a metre square, so lobs and slams are kept in check.

The ball is served automatically from a position in full view above the net, so the vision task is only one of tracking, not of spotting the ball. The net is quarter of a metre high, slowing down the game to a third of a second or so for the journey down the table, and at 12.5 cm diameter the bat covers a substantial part of the playing frame area. I don't say that the contest will be easy, but several teams are well under way with their construction.

The first aspect of the contest is a race to claim the best names – CY Borg and Machineroe have already been christened. If you would like to compete in Mouse or Ping-Pong contest, please contact me at Portsmouth Polytechnic Department of Electrical Engineering, Anglesea Road, Portsmouth PO1 3DJ.

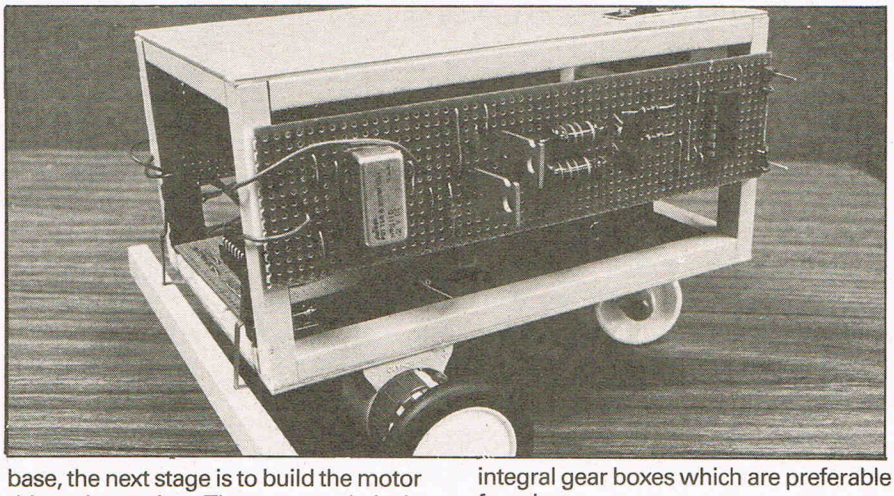
Build a robot mouse

The first part in a series on the circuitry and software required to control a robot

The idea of building a computer controlled robot is very appealing. What usually stops people constructing such machines is the design and construction of the hardware. Building robots requires a range of different skills: computing for the control software, electronics for the control hardware and mechanical construction to build the mechanical base of the machine. To simplify these problems the robot design should be kept as basic as possible. The simplest form of robot is the mobile or "turtle" robot.

A turtle robot has a very simple mechanical base and consists of a rectangular perspex plate to the front end of which are attached two small five volt DC motors. These motors directly drive small model airplane wheels. In the centre of the rear end of the plastic base plate is a small furniture castor.

The construction is very simple and for the "turtle" shown on the front cover of this magazine all the mechanical parts were bought from a model shop for just a few pounds (except the castor which came from a hardware store). Construction tools were confined to a sharp knife, a small hacksaw, a ruler, and plastic cement.



Having constructed a mechanical base, the next stage is to build the motor drive electronics. These are relatively simple to construct and the dedicated experimenter will find the circuits useful for controlling a whole range of power devices.

The simplest and cheapest type of robot motors are the small, low-voltage DC motors sold in model shops. Such motors usually run on five or six volts at 750 milliamps and can thus be conveniently powered by a rechargeable battery onboard the robot. The usual cost of such motors is £2. For about £10 you can hire small DC motors with integral gear boxes which are preferable for robots.

Two controls are required for a DC motor – speed and direction. Speed can be controlled by changing the supply voltage, and direction of rotation by switching the polarity of the motor power supply. In order to perform both these functions we need a simple switch circuit which will allow the computer to control the DC load in a small motor. Additional circuitry is also required to protect the computer if high voltages are used.

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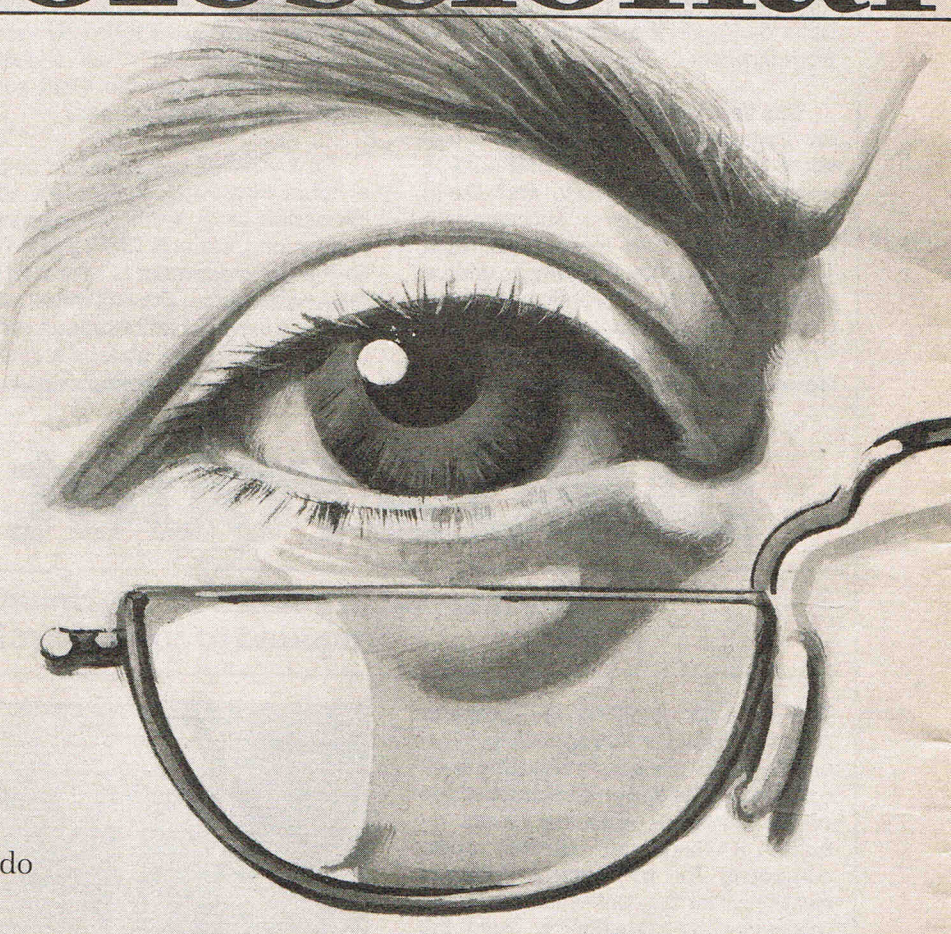

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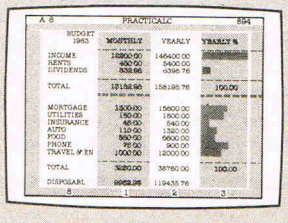

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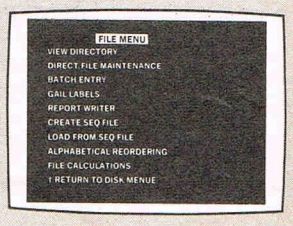

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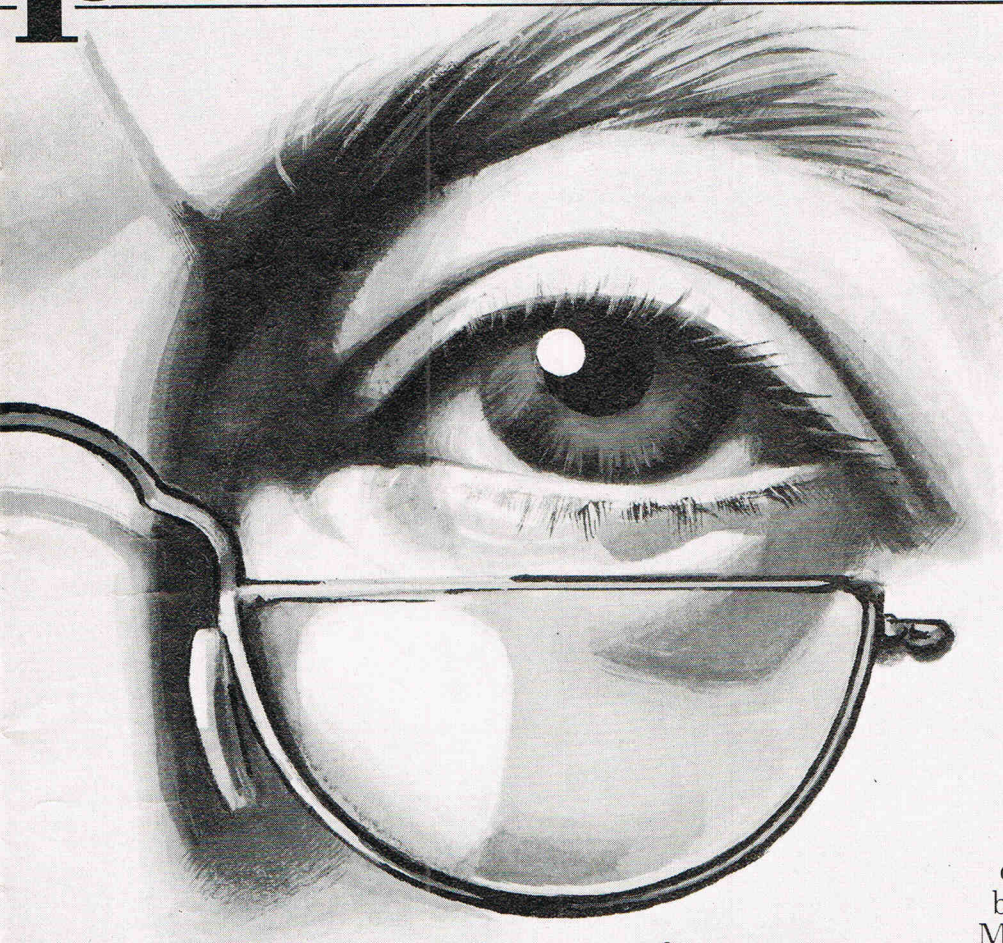

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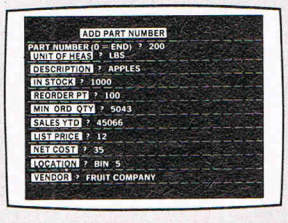
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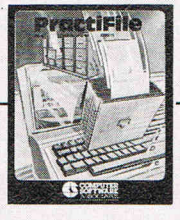

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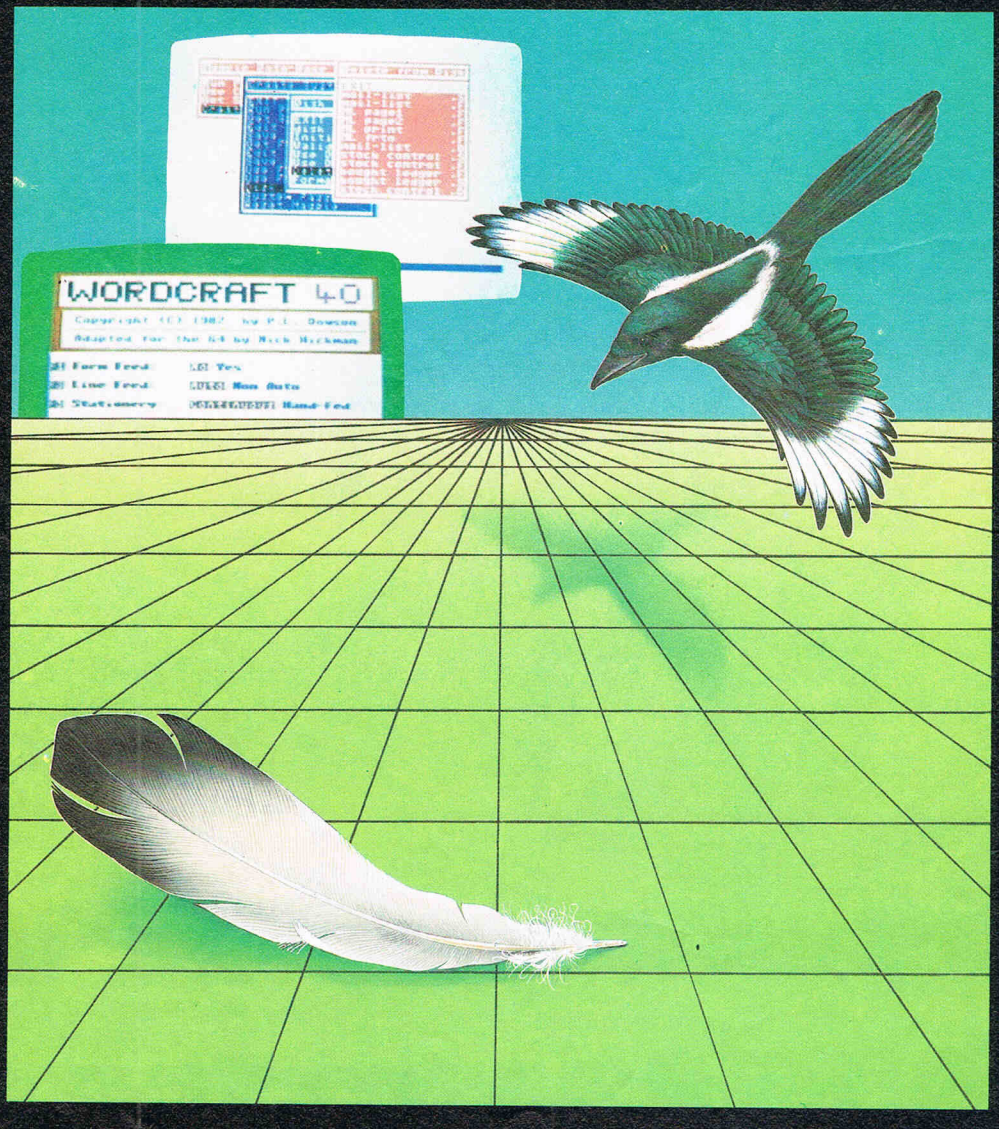

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A basic circuit configuration for switching small DC loads is shown in Fig. 1. These loads can range from five to 25 volts with current consumption of several amps. Such a circuit can be used not only for controlling DC motors but also relays, solanoids, lamps and stepper motors and is therefore an invaluable basic circuit for the experiment. This circuit is, of course, not the only way of performing this function – solid state relays offer an excellent method with the benefits of opto-isolation, ease of driving by a computer I/O port and both fairly high load switching and response frequency. They are however still fairly expensive.

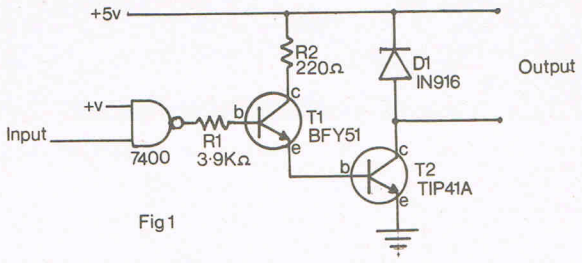


Fig 1

The basic operation of the circuit is quite simple. When the output of the 7400 inverting gate rises, the emitter of transistor T1 rises to the same voltage as its base. Current then flows through the circuit limiting resistor R2 and T1 into the base of T2. While the base of T2 is held more than 0.8 volts above its emitter, the device will conduct. Current can then flow through the load. When the ouput of the 7400 drops to logic 0, then the emitter of T1 also falls to a low voltage level and T2 ceases to conduct.

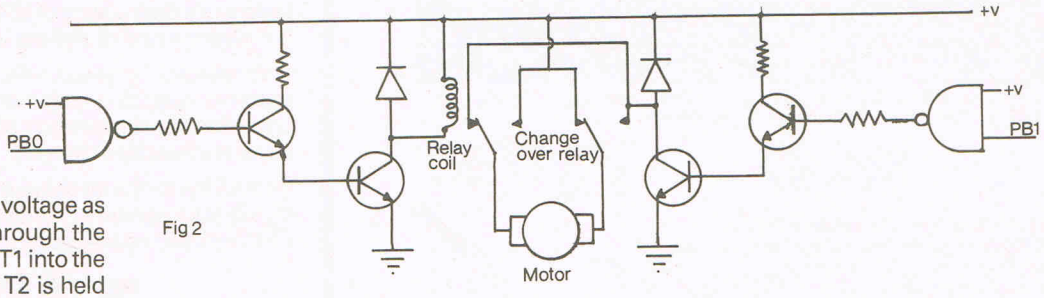


Fig 2

The power transistor used in this circuit TIA 41A has the disadvantage of a low current gain. This means that if it is to pass a large current through its load then T1 must supply a smaller, but still high current to its base. The resistor R2 is placed in the circuit to prevent excessive current flowing through T1. If the TIP 41A is used then the load should not be more than one amp. For large loads the 2N 3055 can be used to replace the TIP 41A and the value of R2 can now be reduced to 10 ohms. Since this transistor has a higher current gain, current loads of several amps can now be switched.

It should be added that many devices with inductive loads, such as motors and relays, produce spikes of back emf. These could damage the circuit components, and therefore diode DI is included to protect against this.

To control a small DC motor, two of these circuits were built on a single PC board and the inputs to the 7400 connected to two output lines of the computer. One of the circuits is used to energise the coil of a double pole changeover relay, the function of which is to reverse the motor's polarity and therefore its direction of rotation.

The method of connection is shown in figure 2 – this is the complete motor control circuit. The second circuit controls the power supply to the motor, switching it on or off. The motor can now be directly controlled by the computer via the connections between the circuits and the I/O ports.

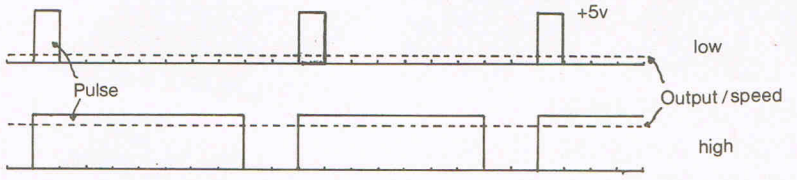


Fig 3

Since these currents only switch the motor on and off, the motor's speed is controlled by a technique known as pulse-width modulation. Here the motor is turned on for a period and then off. The ratio of on and off times determines the speed of rotation. If these time periods are very small then the mechanical inertia within the motor will cause the pulses to be smoothed out and the consequential integration gives a varying motor supply voltage and therefore speed. This is diagramatically shown in figure 3. A program to control the speed of a DC motor is shown in figure 4.

```
   0  C000  A940     LDA  #$40
   1  C002  8D03DD   STA  $DD03
   2  C005  A200     LDX  #$00
   3  C007  8E01DD   STX  $DD01
   4  C00A  E8       INX
   5  C00B  E4FB     CPX  $FB
   6  C00D  D0FB     BNE  $C00A
   7  C00F  A940     LDA  #$40
   8  C011  8D01DD   STA  $DD01
   9  C014  E8       INX
  10  C015  D0FD     BNE  $C014
  11  C017  A5C5     LDA  $C5
  12  C019  C940     CMP  #$40
  13  C01B  F0E8     BEQ  $C005
  14  C01D  60       RTS
READY.
```

```
10 SYS49152
20 GETA$
30 POKE251,VAL(A$)*25+1
40 WAIT197,64:POKE198,0:GOTO10
READY.
```

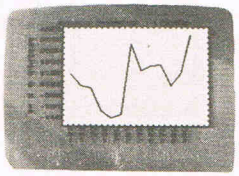
Fig 4

Saxon Computing

FIGARO 64

for

commodore 64



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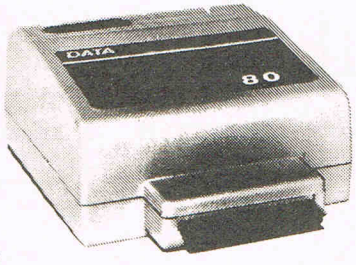

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Elementary Watson

No-one could possibly expect to buy a Commodore computer and find out all they need to know about computing from the manuals provided. Unfortunately much of the other material that's available takes you no further than the manuals. There are exceptions, of course, and one of these is Dr Watson's Beginners Basic Course for the 64.

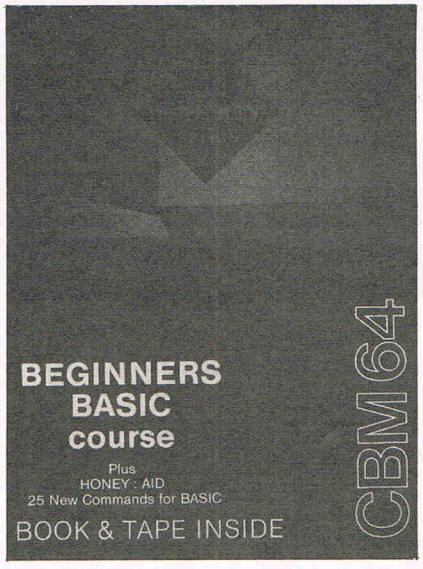
This is one of the range of Dr Watson tutorial packages consisting of programs and written material. The Dr Watson series is rapidly becoming recognised as quality material.

This course consists of a program tape and a 300 plus page book. The whole package is excellently presented in a hardwearing plastic cover. The manual starts off with a guided tour of the keyboard and finishes with a brief introduction to machine code, covering almost everything else along the way.

Realising that most newcomers to computers play games, seven games are provided on tape. Although none of these would warrant a CCI star rating, they have each been carefully chosen, and written, to demonstrate various capabilities of the 64 and particular programming techniques. After the initial chapter, the listings for these games are used to show how programs are built up and new commands are introduced and explained both with written text, and small example programs. Interspersed throughout the book are exercises to ensure that you really are understanding each new command or technique, but at no stage do these become 'hard work', in fact the course consistantly encourages you to learn more and more by making learning fun.

The two authors, P Holmes and D J Bush have obviously taken a great deal of time to produce a well thought out tutorial, and if this was the total content of the course, it would prove excellent value. However there is more . . . much more.

Side two of the cassette contains 'HONEYAID', a collection of no less than



28 additional basic commands in a 4K machine code program. Once loaded these commands sit 'above' basic, and allow many features of the '64' to be explored effortlessly. The commands are split into three broad sections, Toolkit commands, and supplementary Graphic and Sound commands. Among the 15 Toolkit commands are Append, Auto (line numbering), Delete, Old and (Re)Number, and these soon become invaluable when writing your own programs. The five Graphic and seven Sound commands make it almost possible to eliminate all those thousands of POKE commands that seem to make up the bulk of any 64 program. All commands are 'tokenised' and can be reduced to the first one or two letters followed by the shifted next letter as per the standard Commodore commands. These 28 commands almost totally dispel the main criticism of the '64', its version 2 basic.

Side two also contains a clever 'Compuer Aided Learning Program', "guess the number". After allowing you to play this simple game, the program then explains itself to you line by line and command by command, and graphically demonstrates some of the more familiar commands and concepts of programming such as the For . . Next loop and comparative operators (< >). And still there is more. A Character editor, a Sprite editor and a marvellous sound manipulation program Composatune.

Composatune allows you to compose melodies note by note on a musical stave and save these for later use in your own program, it also incorporates a useful sound synthesizer subroutine which allows you to alter the sound of each note whilst hearing what you are doing and seeing which values are being poked into which locations. Unless you have a PHd in music, this is the easiest way to discover the effects of Attack, Delay and rest of those strange words referred to in the Commodore manual.

As with the games, these last three programmes are all explained line by line in the manual, and themselves form the latter part of the course.

If the remainder of The Dr. Watson computer learning series match the standard of this, then not only Commodore, but many other computer manufacturers have been shown how an introductory manual should be written.

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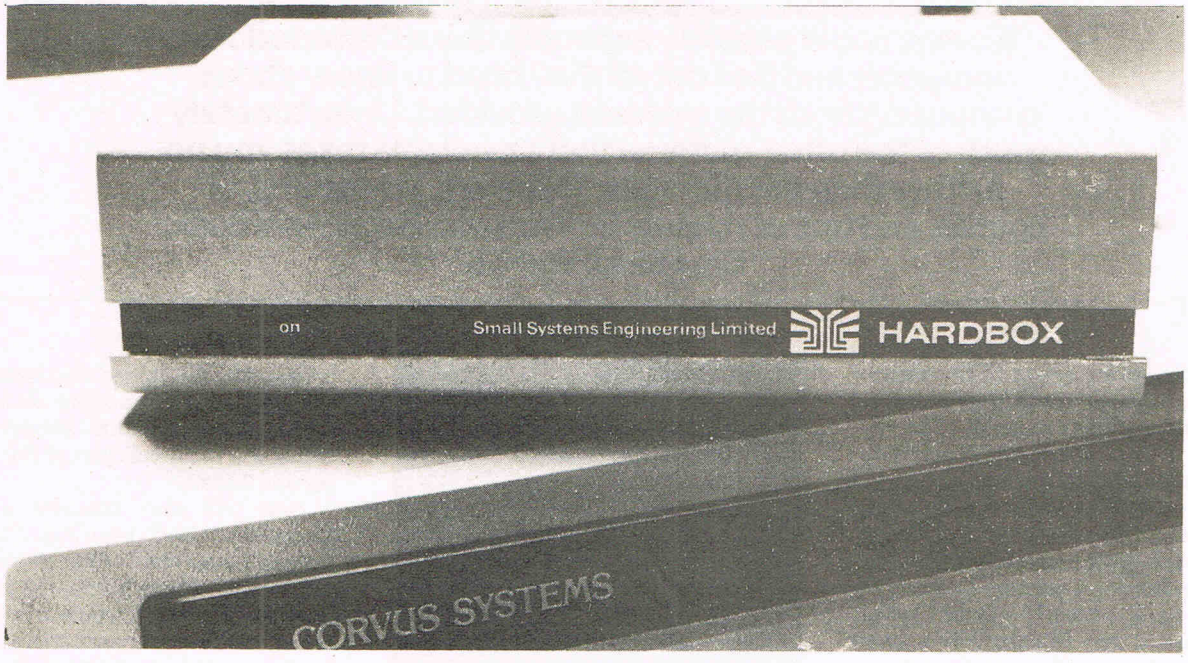

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Versatile plotter

This month we look at Micro Peripherals MCP-40, a four-colour printer/plotter

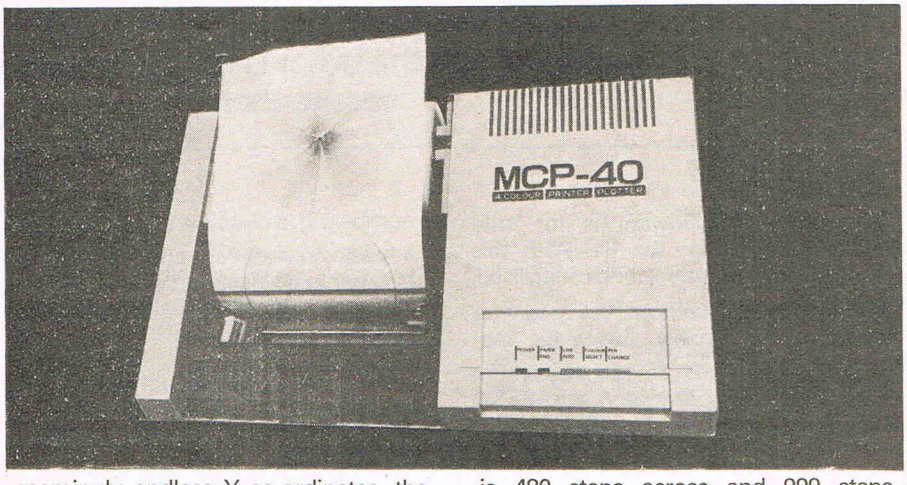
One of the most pleasing things about the MCP-40, besides its extremely versatile plotting abilities, quality print and four colours is that it was so easy to use. Unfortunately, to connect it to the 64 an interface is needed – either a Commodore serial to Centronics or a Commodore user port to Centronics.

The panel on the front of the plotter contains controls to select a colour, move the paper or change a pen. It also indicates if the power is on or if the paper has run out. The pens, which look rather like biros, are fitted into a holder and rotated by the plotter itself. Graphics and text are drawn on a roll of paper about 4.5 inches wide. The pen holder is a delicate mechanism, but the panel controls can be used to change any pen minimising unnecessary handling.

There are two modes of operation; the Text mode for word processing, writing text and programs and the Graphic Mode for generating graphs, pie charts and other pictures which need to be plotted. It should be noted here that it will not reproduce Commodore Graphic characters in listings, but it wouldn't be too difficult to write a driver program to actually draw the characters on the paper itself. There is also a self test mode in which four boxes are drawn, one in each colour so that the user can check that they are all working.

Micro Peripherals have programmed the plotter to understand certain commands and these are clearly explained in the manual together with an example showing how each one can be used in a program. To vary the print size in Text mode, the DIP switch can be set at either 80 or 40 characters per line. There is no problem switching to graphics mode and text mode in the program so if a diagram needs to be accompanied by an explanation this is quite straightforward. Anyone with some knowledge of BASIC and the CBM 64 would have no trouble in producing some very interesting and versatile pictures or diagrams using the commands available.

The plotter can print backwards, upwards, upside down and with the 63 different sizes of text, four colours and



seemingly endless Y co-ordinates, the users imagination and curiosity will be rewarded with spectacular displays. The paper is friction fed and can be made to move backwards as well as forwards providing extra versatility.

The Plotter always knows what colour pen it is using and will usually start with black unless programmed to do otherwise. The initials that are used to control the plotting functions are straightforward. For instance 'C' is used to change the pen colour and the Green is '2', so to change the pen to green in the program, 'C2' is typed in. 'D' stands for destination and specifies the end point that the pen must go to, 'Q' represents direction and the user can specify what direction the printing goes in. The paper is 480 steps across and 999 steps downwards so it can plot and print very accurately.

There are some sample programs in the manual which demonstrate the plotting and printing capabilities of the printer. There is also a table listing all the characters the printer will print together with the ASCII and JIS code which will print them.

The MCP-40 is surprisingly small when its capabilities are considered and operates with very little noise. Small businesses may find it useful, but they would have to write their own programs. Any 64 enthusiast would probably find a use for this printer/plotter and its price, which is low for what it can do, puts it within reach of a lot of people.

Product Name:
MCP-40
Product:
4-colour printer/plotter
Company:
Micro Peripherals Ltd, 69 The Street, Basing, Basingstoke, Hants RG24 0BX
Specifications:
4 pens: red, green, black and blue
Paper roll 4.25 in wide x 180 ft long
Plotting speed: 2.05 ips horizontal
3.80 ips vertical
Printing speed: 12cps
Resolution: 0.00787 inch
Plotting range: 3.804 inch X axis – Divided into 480 steps, no limit in Y axis
80 or 40 characters per line
Pen life is 250m
8-bit parallel interface
3 Modes: Self Test, Text and Graphics
Size:
276mm wide x 174mm deep x 68mm high
Applications:
Plotting and printing in four different colours
Documentation:
Very detailed and clearly worded manual with sample plotting and printing programs
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Auto solutions

This month we have two machine code routines. One is for the 64 and is the next instalment in our Basic Aid routines, and the other is for VIC owners who wish to secure their programs.

Basic Aid

The program following is for auto line-numbering on the 64. With this routine, line numbers once initialised, will be displayed without having to type them in. To enable the auto line-numbering, enter SYS50156, step where step is a value between 1 and 65535 (usually something like 10). Until the line numbering is disabled, using SYS50156, any line entered will cause the next line number to be displayed on the next line. The next line number is the previous one with the step added.

All that is done is that if line numbering is enabled, the next line number is put into the keyboard buffer. Therefore to exit the facility, just press SHIFT RETURN or delete to the beginning of the line. The other way to exit is to press return on a blank line. The latter method, however, will still delete that line.

Like all the other routines, the locations that this routine take up do not conflict with others in the Basic Aids.

```
10 I=50156:T=0
20 READA:IFA=-1THEN50
30 POKEI,A:I=I+1
40 T=T+A:GOTO20
50 IFT<>14298THENPRINT"■■CHECKSUM ERROR:"14298,T
60 PRINT"■■USE SYS50156,STEP TO ENABLE AUTO LINE   NUMBERING.
70 PRINT"■■USE SYS50156 TO DISABLE NUMBERING."
80 PRINT"■■":END
100 DATA32,121,0,240,27,32,253
110 DATA174,32,107,169,165,20,141
120 DATA23,196,165,21,141,24,196
130 DATA169,25,141,4,3,169,196
140 DATA141,5,3,96,169,124,141
150 DATA4,3,169,165,141,5,3
160 DATA96,0,0,173,0,2,201
170 DATA48,144,10,201,58,176,6
180 DATA169,1,133,2,208,4,169
190 DATA0,133,2,32,124,165,165
200 DATA2,208,1,96,192,5,208
210 DATA1,96,173,23,196,24,101
220 DATA20,170,173,24,196,101,21
230 DATA134,99,133,98,162,144,56
240 DATA152,72,32,73,188,32,223
250 DATA189,133,251,132,252,160,0
260 DATA177,251,240,6,153,119,2
270 DATA200,208,246,200,169,32,153
280 DATA119,2,132,198,104,168,96
290 DATA-1
READY.
```

```
 0  C3EC  207900     JSR  $0079
 1  C3EF  F01B       BEQ  $C40C
 2  C3F1  20FDAE     JSR  $AEFD
 3  C3F4  206BA9     JSR  $A96B
 4  C3F7  A514       LDA  $14
 5  C3F9  8D17C4     STA  $C417
 6  C3FC  A515       LDA  $15
 7  C3FE  8D18C4     STA  $C418
 8  C401  A919       LDA  #$19
 9  C403  8D0403     STA  $0304

10  C406  A9C4       LDA  #$C4
11  C408  8D0503     STA  $0305
12  C40B  60         RTS
13  C40C  A97C       LDA  #$7C
14  C40E  8D0403     STA  $0304
15  C411  A9A5       LDA  #$A5
16  C413  8D0503     STA  $0305
17  C416  60         RTS
18  C417  00         BRK
19  C418  00         BRK
20  C419  AD0002     LDA  $0200

21  C41C  C930       CMP  #$30
22  C41E  900A       BCC  $C42A
23  C420  C93A       CMP  #$3A
24  C422  B006       BCS  $C42A
25  C424  A901       LDA  #$01
26  C426  8502       STA  $02
27  C428  D004       BNE  $C42E
28  C42A  A900       LDA  #$00
29  C42C  8502       STA  $02
30  C42E  207CA5     JSR  $A57C
31  C431  A502       LDA  $02
32  C433  D001       BNE  $C436
33  C435  60         RTS
34  C436  C005       CPY  #$05
35  C438  D001       BNE  $C43B
36  C43A  60         RTS
37  C43B  AD17C4     LDA  $C417
38  C43E  18         CLC
39  C43F  6514       ADC  $14
40  C441  AA         TAX
41  C442  AD18C4     LDA  $C418
42  C445  6515       ADC  $15
43  C447  8663       STX  $63
44  C449  8562       STA  $62
45  C44B  A290       LDX  #$90
46  C44D  38         SEC
47  C44E  98         TYA
48  C44F  48         PHA
49  C450  2049BC     JSR  $BC49
50  C453  20DFBD     JSR  $BDDF
51  C456  85FB       STA  $FB
52  C458  84FC       STY  $FC
53  C45A  A000       LDY  #$00
54  C45C  B1FB       LDA  ($FB),Y
55  C45E  F006       BEQ  $C466
56  C460  997702     STA  $0277,Y
57  C463  C8         INY
58  C464  D0F6       BNE  $C45C
59  C466  C8         INY
60  C467  A920       LDA  #$20
61  C469  997702     STA  $0277,Y
62  C46C  84C6       STY  $C6
63  C46E  68         PLA
64  C46F  A8         TAY
65  C470  60         RTS
READY.
```

Auto-Run

Last month we published a routine that would save a Basic program on the 64 with auto-run. In response to that article, one of our readers asked if we could do anything for VIC owners. Well, here it is – an auto-run routine for the VIC.

When run, the routine will be put at the top of memory and it will be protected. 256 bytes are reserved but the routine will work on any expansion of VIC. The problem is that if it is saved with 8K or more expansion, it will only load back in to computers with that expansion and vice-versa.

Also with the auto-run, the screen is cleared and RUN/STOP-RESTORE is disabled as outlined in last month's issue.

```
10 POKE56,PEEK(56)-1:POKE52,PEEK(52)-1
20 I=PEEK(55)+PEEK(56)*256:T=0
30 READA:IFA=-1THEN60
40 POKEI,A:I=I+1
50 T=T+A:GOTO30
60 IFT<>20661THENPRINT"CHECKSUM ERROR":END
70 PRINT"□TO SAVE WITH AUTO-RUN,ENTER:"
90 PRINT"SYS"PEEK(55)+PEEK(56)*256;CHR$(34)"FILENAME"CHR$(34)
90 END
```

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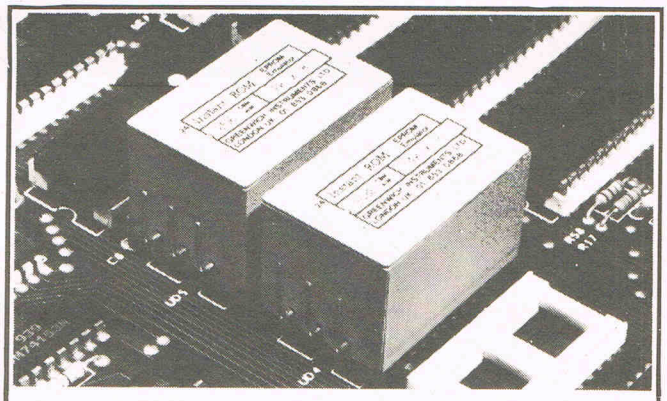
SUPERSCRIPT II (CBM 8096)	~~£395.00~~	£326.09
SUPERBASE (CBM 8096)	~~£450.00~~	£369.57
MEMORY UPGRADE (converts 8032 to 8096)	~~£300.00~~	£250.00
PM96 Memory Management/Toolkit etc	~~£99.50~~	£86.91
COMMODORE 2000/8000		
SUPERSCRIPT (CBM 2000/3000/4000/8000)	~~£249.00~~	£195.65
SUPERSPELL (CBM 2000/3000/4000/8000)	~~£150.00~~	£117.39
MASTER (CBM 4000/8000/8096)	~~£295.00~~	£195.65
VISICALC (CBM 2000/3000/4000/8000)	~~£175.00~~	£140.00
KRAM keyed disk access (CBM 3000/4000/8000)	~~£99.50~~	£86.91
DTL COMPILER (CBM 2000/3000/4000/8000)	~~£99.50~~	£94.78
COMMAND-O 39 toolkit commands (CBM 4000/8000)		£50.00
COMMODORE 64		
SUPERBASE 64 database (disk)	~~£86.91~~	£76.52
VIZAWRITE 64 word-processor (disk)	~~£69.52~~	£59.13
VIZAWRITE 64 (cartridge) for tape or disk	~~£78.22~~	£65.22
VIZASPELL 64 disk dictionary/spelling checker	~~£59.13~~	£51.30
VIZAWRITE + VIZASPELL combined (disk)	~~£86.91~~	£73.91
MASTER 64 Basic IV + 85 new commands (disk)	~~£125.00~~	£100.00
DTL COMPILER 64 (disk)	~~£99.50~~	£94.78
DTL COMPILER 64 (tape)	~~£34.75~~	£32.13
TOOL 64 Toolkit/DOS Support etc. (cartridge)	~~£43.43~~	£40.83
PRACTICALC 64 Spreadsheet (disk or tape)		£38.70

PRICES SHOWN EXCLUDE 15% VAT, AND ARE CORRECT ON GOING TO PRESS. ORDER BY POST OR TELEPHONE, USING CHEQUE, ACCESS, BARCLAY CARD OR OFFICIAL ORDER. DESPATCH IS BY RETURN 1ST CLASS POST, AND FREE EXCEPT FOR OVERSEAS AND CREDIT ORDERS. PRODUCT INFORMATION IS AVAILABLE ON REQUEST. [REF A26]

Calco Software

LAKESIDE HOUSE, KINGSTON HILL, SURREY KT2 7QT. TEL 01-546-7256



INSTANT ROM (Commodore Approved)

Greenwich Instruments' ROM/EPROM Emulators are non-volatile memory modules which plug into any ROM/EPROM socket. When the power is switched off, data is retained for up to 10 years. Emulators from 2 Kbytes to 32Kbytes are available.

In the PET, a 4Kbyte Emulator can be fitted in the 9000 or A000 socket, and used for fast program development. Basic or Machine-code programs can be stored permanently.

GR2532 4Kbyte Emulator £56.00
Adaptor GA1 (essential for PET users) ..... £ 6.00

PETCLOCK (Commodore Approved)

PETCLOCK plugs into any Commodore machine with User-Port, and gives time (hour/minute/second) and date (year/month/date/day of week). Battery backup—accuracy is maintained when the power is off.

GCC1 PETCLOCK £62.00

G-ROM E

A 4 Kbyte EPROM which runs, at switch-on, any Basic or Machine-code program stored in INSTANT ROM, eliminating the need for tape or disc. Basic programs can be stored with a few key-strokes.

Some powerful utilities are included for program revival. PET's power-up memory test is made non-destructive, and UN-NEW us provided. A program for reading Date and time from PETCLOCK is also included.

G-ROM E (specify type of PET) £25.00

Postage (£1.00) and VAT are extra. Leaflets are available.

GREENWICH INSTRUMENTS LIMITED
THE CRESCENT, MAIN ROAD, SIDCUP, KENT DA14 6NW
Telephone: 302 4931 – Telex: 896691 Attn. GIL

PET CONVERSIONS & UPGRADES

It's here at a **NEW** low low price!! Don't throw out your old 9" PET. The **MICROPORT 80** column conversion board for the 9" PET/CBM BASIC 4.0, or upgraded 2001/3000 series machines, will upgrade it to a true 8000 series. Simply plugs into the main logic board and with a small keyboard modification turns your PET into an 8032. Compatible with 8032 software and add-on ROM utilities. Supplied complete with full fitting instructions, or fitted free of charge if brought to our workshops.

Full money back guarantee within 14 days if not delighted.	£125.00
Externally mounted switching unit for above (40/80 column switchable)	£15.00
12" VDU (FAT40) 80 column conversion	£82.00
40 to 80 column switchable (two machines in one!)	£98.00

Full keyboard functions:– i.e. TAB, ESC, REPEAT, SCROLL up/down, define WINDOW, lower case, graphics mode & DELETE from/to cursor. All available in direct or program mode. Any MICROPORT converted machine is also upgradable to 8096 specification with our 64K add-on board. £250.00

CBM 64 QUALITY SOFTWARE

If you own a PET system with disks or printer and have added a COMMODORE 64 then why not use your PET as an interface for the 64?

SIPOD is a serial IEEE to parallel IEEE software interface allowing you to use all the PETs disk drives, printers, plotters, modems etc. directly from the 64. No memory space is consumed within the 64 as **SIPOD** loads and executes within the PET. **SIPOD** is supplied complete with interface lead and instructions. £29.00

PRINTLINK 64. Interfaces a 64 directly to any printer with a Centronics input. The printer will respond to all the normal Basic commands for device #4. Supplied complete with instructions and interface cable. £26.00

We only sell one word processor for the 64. We think it is the best!

VIZAWRITE 64. Text formatting word processor. Disk or cartridge	£69.00
VIZASPELL 64. Spelling checker with 30,000 word dictionary	£59.00
VIZAWRITE + VIZASPELL. Combined package. (Disk only)	£99.00
MIKRO ASSEMBLER. Write machine code with the ease of BASIC	£50.00
ARROW. Save & load to tape up to 7 times faster than normal	£39.00
VICTREE. All Toolkit & BASIC 4.0 commands plus a lot more	£49.00
ZOOM. An excellent machine code monitor for the 64	£10.00
GRAPHIX 64. Easy to use Hi-Resolution graphics from BASIC	£10.00
STIX. A most addictive and compelling game (joystick required)	£17.35

Official orders from schools, universities, major companies etc. are welcome. U.K. customers please add 15% VAT. Prepaid orders are POST FREE.

Telephone Mick Bignell for details of any of the above at:–

MICROPORT 7 Clydesdale Close, Borehamwood, Herts. WD6 2SD. Tel: 01-953 8385

```
100 DATA165,43,133,251,165,44,133
110 DATA252,169,189,133,43,141,2
120 DATA3,169,2,133,44,141,3
130 DATA3,165,45,133,253,165,46
140 DATA133,254,169,3,133,46,169
150 DATA4,133,45,160,167,177,55
160 DATA153,88,2,136,192,100,208
170 DATA246,32,209,225,169,3,133
180 DATA185,32,96,225,165,251,133
190 DATA43,165,252,133,44,165,253
200 DATA133,45,165,254,133,46,169
210 DATA131,141,2,3,169,196,141
220 DATA3,3,169,1,170,168,32
230 DATA186,255,169,0,32,189,255
240 DATA76,86,225,169,196,141,3
250 DATA3,169,131,141,2,3,169
260 DATA147,32,210,255,169,126,141
270 DATA40,3,169,0,133,157,32
280 DATA213,255,169,1,170,168,32
290 DATA186,255,169,0,170,168,32
300 DATA189,255,32,213,255,134,45
310 DATA134,47,134,49,132,46,132
320 DATA48,132,50,169,0,32,94
330 DATA198,32,142,198,76,174,199,-1
READY.
```

CURSOR CHARACTERS

```
■ - By pressing the cursor down key
■ - By pressing the cursor down key with the shift key
■ - By pressing the cursor right key
■ - By pressing the cursor right key with the shift key
■ - By pressing the home key
■ - By pressing the home key with the shift key
■ - By pressing the control key and key 1
■ -                                key 2
■ -                                key 3
■ -                                key 4
■ -                                key 5
■ -                                key 6
■ -                                key 7
■ -                                key 8
■ - By pressing the CBM key with   key 1
■ -                                key 2
■ -                                key 3   ■ - By pressing key F1
■ -                                key 4   ■ - By pressing key F2
■ -                                key 5   ■ - By pressing key F3
■ -                                key 6   ■ - By pressing key F4
■ -                                key 7   ■ - By pressing key F5
■ -                                key 8   ■ - By pressing key F6
■ - By pressing the control key and key 9   ■ - By pressing key F7
■ -                                key 0   ■ - By pressing key F8
```

Music maestro

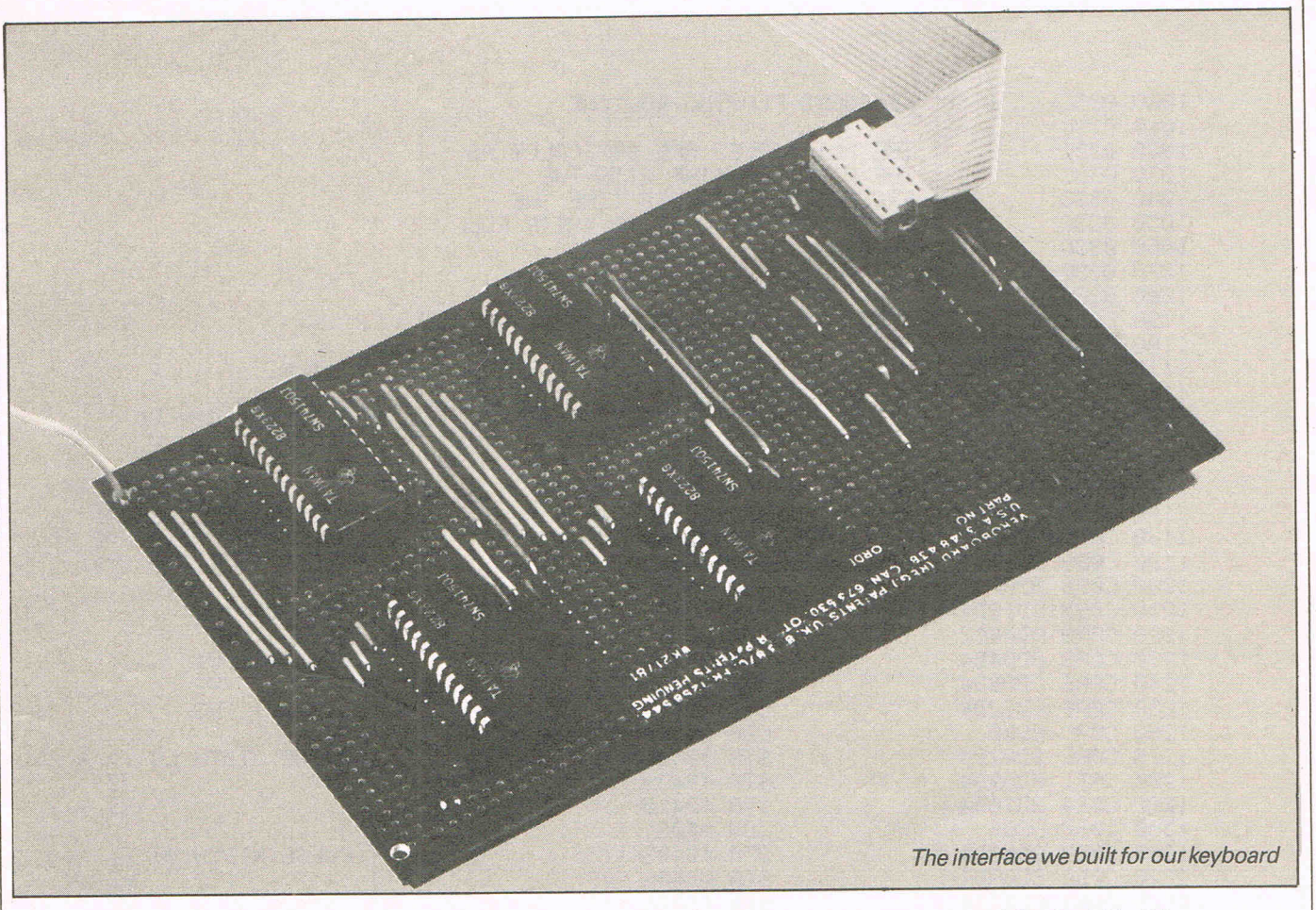
In the December '83 edition of Commodore Computing, we published an article on how to connect a 4-octave piano keyboard to the 64. In that article, we also mentioned that there would be other programs to follow. This program replaces the previous one and allows full use of the SID chip's envelope facility.

The principles behind the playing are as the first program except that instead of just reading the first three keys, all keys are read so that a note already playing will have precedence over other keys. The note is only played if it is not already being played. If it is, it is left alone.

There is one other major difference, that is it has been written so that if you have a 5-octave keyboard, most of the other notes can be played.

To alter the envelopes, direct POKEing to the SID chip is necessary but the wave form can be changed by just one poke to location 49742. The value sent to this location must be with the gate (bit 0) off ie the number must be even.

```
10 I=49152:T=0
20 READA:IFA=-1THEN50
30 POKEI,A:I=I+1
40 T=T+A:GOTO20
50 IFT<>73153THENPRINT"CHECKSUM ERROR":END
60 IFI<>49750THENPRINT"NUMBER OF DATA VELUES ERROR":END
70 PRINT"■■■KEYBOARD NOW ACTIVE"
80 PRINT"■■":SYS49280:END
100 DATA0,0,147,8,21,9,159
110 DATA9,50,10,205,10,113,11
120 DATA32,12,216,12,156,13,107
130 DATA14,71,15,47,16,38,17
140 DATA43,18,63,19,100,20,155
150 DATA21,227,22,64,24,177,25
160 DATA56,27,215,28,142,30,95
170 DATA32,76,34,86,36,127,38
180 DATA201,40,54,43,199,45,128
190 DATA48,99,51,113,54,174,57
200 DATA28,61,190,64,152,68,172
210 DATA72,254,76,146,81,108,86
220 DATA143,91,1,97,198,102,226
230 DATA108,92,115,56,122,124,129
240 DATA48,137,88,145,252,153,36
250 DATA163,215,172,30,183,1,194
260 DATA138,205,194,217,180,230,107
270 DATA244,255,255,0,0,127,255
280 DATA0,0,169,15,141,3,221
290 DATA169,192,141,5,212,141,12
300 DATA212,141,19,212,169,249,141
310 DATA6,212,141,13,212,141,20
320 DATA212,169,15,141,24,212,173
330 DATA78,194,141,4,212,141,11
340 DATA212,141,18,212,169,0,141
350 DATA2,212,141,9,212,141,16
360 DATA212,169,8,141,3,212,141
```



The interface we built for our keyboard

```
370 DATA10,212,141,17,212,120,169
380 DATA207,141,20,3,169,192,141
390 DATA21,3,88,96,160,0,132
400 DATA251,140,1,221,173,1,221
410 DATA133,2,41,32,240,12,24
420 DATA152,105,17,166,251,157,85
430 DATA194,232,134,251,165,2,41
440 DATA64,240,12,24,152,105,33
450 DATA166,251,157,85,194,232,134
460 DATA251,165,2,41,16,240,12
470 DATA24,152,105,1,166,251,157
480 DATA85,194,232,134,251,165,2
490 DATA41,128,240,12,24,152,105
500 DATA49,166,251,157,85,194,232
510 DATA134,251,200,152,41,15,240
520 DATA4,168,76,211,192,166,251
530 DATA224,3,176,8,169,0,157
540 DATA85,194,232,208,244,134,251
550 DATA160,0,185,85,194,240,5
560 DATA205,79,194,240,13,200,196
570 DATA251,208,241,169,0,141,82
580 DATA194,76,94,193,169,1,141
590 DATA82,194,169,0,153,85,194
600 DATA160,0,185,85,194,240,5
610 DATA205,80,194,240,13,200,196
620 DATA251,208,241,169,0,141,83
630 DATA194,76,129,193,169,1,141
640 DATA83,194,169,0,153,85,194
650 DATA160,0,185,85,194,240,5
660 DATA205,81,194,240,13,200,196
670 DATA251,208,241,169,0,141,84
680 DATA194,76,164,193,169,1,141
690 DATA84,194,169,0,153,85,194
700 DATA173,82,194,208,43,32,55
710 DATA194,205,79,194,240,35,141
720 DATA79,194,10,168,173,78,194
730 DATA141,4,212,173,79,194,240
740 DATA19,185,0,192,141,0,212
750 DATA185,1,192,141,1,212,174
760 DATA78,194,232,142,4,212,173
770 DATA83,194,208,43,32,55,194
780 DATA205,80,194,240,35,141,80
790 DATA194,10,168,173,78,194,141
800 DATA11,212,173,80,194,240,19
810 DATA185,0,192,141,7,212,185
820 DATA1,192,141,8,212,174,78
830 DATA194,232,142,11,212,173,84
840 DATA194,208,43,32,55,194,205
850 DATA81,194,240,35,141,81,194
860 DATA10,168,173,78,194,141,18
870 DATA212,173,81,194,240,19,185
880 DATA0,192,141,14,212,185,1
890 DATA192,141,15,212,174,78,194
900 DATA232,142,18,212,76,49,234
910 DATA160,0,185,85,194,240,8
920 DATA72,169,0,153,85,194,104
930 DATA96,200,196,251,208,238,169
940 DATA0,96,16,0,0,0,0
950 DATA0,0,0,-1
READY.
```

```
1000 033C          ! KEYBOARD PLAYING ROUTINE
1010 033C          !
1020 033C          ! THE PRINCIPLES ARE BASICALLY AS
1030 033C          ! THE FIRST ROUTINE WITH THE
1040 033C          ! EXCEPTION THAT THIS TIME THE
1050 033C          ! ENVELOPES ARE USED TO THEIR FULL
1060 033C          ! EXTENT.
1070 033C          !
1080 033C          !
1090 C080          *=$C080 ! START OF CODE
1100 C080 A90F               LDA #$0F
1110 C082 8D03DD             STA $DD03          ! D.D.R.
1120 C085 A909               LDA #$09
1130 C087 8D05D4             STA $D405          ! ATTACK/DECAY V1
1140 C08A 8D0CD4             STA $D40C          !              V2
1150 C08D 8D13D4             STA $D413          !              V3
1160 C090 A900               LDA #$00
1170 C092 8D06D4             STA $D406          ! SUSTAIN/RELEASE V1
1180 C095 8D0DD4             STA $D40D          !                 V2
1190 C098 8D14D4             STA $D414          !                 V3
1200 C09B A90F               LDA #$0F
1210 C09D 8D18D4             STA $D418          ! VOLUME
1220 C0A0 AD4EC2             LDA WAVE
1230 C0A3 8D04D4             STA $D404          ! WAVEFORM V1
1240 C0A6 8D0BD4             STA $D40B          !          V2
1250 C0A9 8D12D4             STA $D412          !          V3
1260 C0AC A900               LDA #$00
1270 C0AE 8D02D4             STA $D402          ! PULSE WIDTH LO V1
1280 C0B1 8D09D4             STA $D409          !                V2
1290 C0B4 8D10D4             STA $D410          !                V3
1300 C0B7 A908               LDA #$08
1310 C0B9 8D03D4             STA $D403          ! PULSE WIDTH HI V1
1320 C0BC 8D0AD4             STA $D40A          !                V2
1330 C0BF 8D11D4             STA $D411          !                V3
1340 C0C2 78                 SEI
1350 C0C3 A9CF               LDA #<TESTER       ! PUT CODE INTO
1360 C0C5 8D1403             STA $0314          ! IRQ
1370 C0C8 A9C0               LDA #>TESTER
1380 C0CA 8D1503             STA $0315
1390 C0CD 58                 CLI
1400 C0CE 60                 RTS
1410 C0CF          !
1420 C0CF          ! START OF KEYBOARD ROUTINE
1430 C0CF          !
1440 C0CF A000     TESTER    LDY #$00           ! INITIALISE LOOP
1450 C0D1 84FB               STY $FB            ! NUMBER OF KEYS READ
1460 C0D3 8C01DD INPUT       STY $DD01          ! SEND TO USER PORT
1470 C0D6 AD01DD             LDA $DD01          ! READ USER PORT
1480 C0D9 8502               STA $02
1490 C0DB 2920               AND #$20           ! TEST CHIP 2
1500 C0DD F00C               BEQ NOT1           ! NOTHING
1510 C0DF 18                 CLC                ! STORE IN TEMPORARY
1520 C0E0 98                 TYA                ! AREA FOR LATER USE
1530 C0E1 6911               ADC #$11
1540 C0E3 A6FB               LDX $FB
1550 C0E5 9D55C2             STA INPUTTED,X
1560 C0E8 E8                 INX
1570 C0E9 86FB               STX $FB
1580 C0EB A502     NOT1      LDA $02
1590 C0ED 2940               AND #$40           ! TEST CHIP 3
1600 C0EF F00C               BEQ NOT2           ! NOTHING
1610 C0F1 18                 CLC                ! STORE IN TEMPORARY
1620 C0F2 98                 TYA                ! AREA FOR LATER USE
```

```
1630 C0F3 6921              ADC #$21
1640 C0F5 A6FB              LDX $FB
1650 C0F7 9D55C2            STA INPUTTED,X
1660 C0FA E8                INX
1670 C0FB 86FB              STX $FB
1680 C0FD A502   NOT2       LDA $02
1690 C0FF 2910              AND #$10                ! TEST CHIP  1
1700 C101 F00C              BEQ NOT3                ! NOTING
1710 C103 18                CLC                     ! STORE IN TEMPORARY
1720 C104 98                TYA                     ! AREA FOR LATER USE
1730 C105 6901              ADC #$01
1740 C107 A6FB              LDX $FB
1750 C109 9D55C2            STA INPUTTED,X
1760 C10C E8                INX
1770 C10D 86FB              STX $FB
1780 C10F A502   NOT3       LDA $02
1790 C111 2980              AND #$80                ! TEST CHIP 4
1800 C113 F00C              BEQ NOT4                ! NOTHING
1810 C115 18                CLC                     ! STORE IN TEMPORARY
1820 C116 98                TYA                     ! AREA FOR LATER USE
1830 C117 6931              ADC #$31
1840 C119 A6FB              LDX $FB
1850 C11B 9D55C2            STA INPUTTED,X
1860 C11E E8                INX
1870 C11F 86FB              STX $FB
1880 C121 C8     NOT4       INY                     ! COMPLETE READING
1890 C122 98                TYA                     ! LOOP
1900 C123 290F              AND #$0F
1910 C125 F004              BEQ COMPLETE
1920 C127 A8                TAY
1930 C128 4CD3C0            JMP INPUT
1940 C12B        !
1950 C12B        ! INPUT COMPLETED. NOW PAD
1960 C12B        ! OUT TO 3 NOTES
1970 C12B        !
1980 C12B A6FB   COMPLETE   LDX $FB
1990 C12D E003   PAD        CPX #$03                ! CHECK FOR 3 KEYS
2000 C12F B008              BCS ENOUGH              ! YES
2010 C131 A900              LDA #$00                ! SET TO ZERO
2020 C133 9D55C2            STA INPUTTED,X
2030 C136 E8                INX
2040 C137 D0F4              BNE PAD                 ! AND AGAIN
2050 C139        !
2060 C139        ! NOW CHECK FOR A KEY THAT
2070 C139        ! WAS BEING PLAYED LAST CHECK
2080 C139        !
2090 C139 86FB   ENOUGH     STX $FB
2100 C13B A000              LDY #$00
2110 C13D B955C2 CHECK1     LDA INPUTTED,Y          ! CHECK V1
2120 C140 F005              BEQ NEXT1               ! NOT THAT ONE
2130 C142 CD4FC2            CMP VOICE1
2140 C145 F00D              BEQ CONT1               ! YES
2150 C147 C8     NEXT1      INY                     ! NEXT INPUTTED KEY
2160 C148 C4FB              CPY $FB
2170 C14A D0F1              BNE CHECK1
2180 C14C A900              LDA #$00                ! NO COMPARISON
2190 C14E 8D52C2            STA V1FLAG
2200 C151 4C5EC1            JMP CHECKV2
2210 C154 A901   CONT1      LDA #$01                ! COMPARISON FOUND
2220 C156 8D52C2            STA V1FLAG
2230 C159 A900              LDA #$00
2240 C15B 9955C2            STA INPUTTED,Y          ! BLANK KEY
2250 C15E A000   CHECKV2    LDY #$00
```

```
2260 C160 B955C2 CHECK2      LDA INPUTTED,Y          ! CHECK V2
2270 C163 F005               BEQ NEXT2               ! NOT THAT ONE
2280 C165 CD50C2             CMP VOICE2
2290 C168 F00D               BEQ CONT2               ! YES
2300 C16A C8     NEXT2       INY                     ! NEXT INPUTTED KEY
2310 C16B C4FB               CPY $FB
2320 C16D D0F1               BNE CHECK2
2330 C16F A900               LDA #$00                ! NO COMPARISON
2340 C171 8D53C2             STA V2FLAG
2350 C174 4C81C1             JMP CHECKV3
2360 C177 A901   CONT2       LDA #$01                ! COMPARISON FOUND
2370 C179 8D53C2             STA V2FLAG
2380 C17C A900               LDA #$00
2390 C17E 9955C2             STA INPUTTED,Y          ! BLANK KEY
2400 C181 A000   CHECKV3     LDY #$00
2410 C183 B955C2 CHECK3      LDA INPUTTED,Y          ! CHECK V3
2420 C186 F005               BEQ NEXT3               ! NOT THAT ONE
2430 C188 CD51C2             CMP VOICE3
2440 C18B F00D               BEQ CONT3               ! YES
2450 C18D C8     NEXT3       INY                     ! NEXT INPUTTED KEY
2460 C18E C4FB               CPY $FB
2470 C190 D0F1               BNE CHECK3
2480 C192 A900               LDA #$00                ! NO COMPARISON
2490 C194 8D54C2             STA V3FLAG
2500 C197 4CA4C1             JMP ALLDONE
2510 C19A A901   CONT3       LDA #$01                ! COMPARISON FOUND
2520 C19C 8D54C2             STA V3FLAG
2530 C19F A900               LDA #$00
2540 C1A1 9955C2             STA INPUTTED,Y          ! BLANK KEY
2550 C1A4        !
2560 C1A4        ! PLAY NOTES
2570 C1A4        !
2580 C1A4 AD52C2 ALLDONE     LDA V1FLAG              ! PLAY V1
2590 C1A7 D02B               BNE DO2                 ! LEAVE TO PLAY
2600 C1A9 2037C2             JSR GETVOICE            ! GET A NEW NOTE
2610 C1AC CD4FC2             CMP VOICE1
2620 C1AF F023               BEQ DO2                 ! ZERO NOTE, IGNORE
2630 C1B1 8D4FC2             STA VOICE1
2640 C1B4 0A                 ASL A
2650 C1B5 A8                 TAY
2660 C1B6 AD4EC2             LDA WAVE                ! GATE OFF
2670 C1B9 8D04D4             STA $D404
2680 C1BC AD4FC2             LDA VOICE1
2690 C1BF F013               BEQ DO2                 ! ZERO NOTE LEAVE GATE
OFF
2700 C1C1 B900C0             LDA $C000,Y
2710 C1C4 8D00D4             STA $D400               ! NEW NOTE VALUES
2720 C1C7 B901C0             LDA $C001,Y
2730 C1CA 8D01D4             STA $D401
2740 C1CD AE4EC2             LDX WAVE                ! GATE ON
2750 C1D0 E8                 INX
2760 C1D1 8E04D4             STX $D404
2770 C1D4 AD53C2 DO2         LDA V2FLAG              ! PLAY V2
2780 C1D7 D02B               BNE DO3                 ! LEAVE TO PLAY
2790 C1D9 2037C2             JSR GETVOICE            ! GET A NEW NOTE
2800 C1DC CD50C2             CMP VOICE2
2810 C1DF F023               BEQ DO3                 ! ZERO NOTE, IGNORE
2820 C1E1 8D50C2             STA VOICE2
2830 C1E4 0A                 ASL A
```

```
 2840 C1E5 A8                   TAY
 2850 C1E6 AD4EC2               LDA WAVE                ! GATE OFF
 2860 C1E9 8D0BD4               STA $D40B
 2870 C1EC AD50C2               LDA VOICE2
 2880 C1EF F013                 BEQ DO3                 ! ZERO NOTE LEAVE GATE
OFF
 2890 C1F1 B900C0               LDA $C000,Y
 2900 C1F4 8D07D4               STA $D407               ! NEW NOTE VALUES
 2910 C1F7 B901C0               LDA $C001,Y
 2920 C1FA 8D08D4               STA $D408
 2930 C1FD AE4EC2               LDX WAVE                ! GATE ON
 2940 C200 E8                   INX
 2950 C201 8E0BD4               STX $D40B
 2960 C204 AD54C2 DO3           LDA V3FLAG              ! PLAY V3
 2970 C207 D02B                 BNE DONEALL             ! LEAVE TO PLAY
 2980 C209 2037C2               JSR GETVOICE            ! GET A NEW NOTE
 2990 C20C CD51C2               CMP VOICE3
 3000 C20F F023                 BEQ DONEALL             ! ZERO NOTE, IGNORE
 3010 C211 8D51C2               STA VOICE3
 3020 C214 0A                   ASL A
 3030 C215 A8                   TAY
 3040 C216 AD4EC2               LDA WAVE                ! GATE OFF
 3050 C219 8D12D4               STA $D412
 3060 C21C AD51C2               LDA VOICE3
 3070 C21F F013                 BEQ DONEALL             ! ZERO NOTE LEAVE GATE
OFF
 3080 C221 B900C0               LDA $C000,Y
 3090 C224 8D0ED4               STA $D40E               ! NEW NOTE VALUES
 3100 C227 B901C0               LDA $C001,Y
 3110 C22A 8D0FD4               STA $D40F
 3120 C22D AE4EC2               LDX WAVE                ! GATE ON
 3130 C230 E8                   INX
 3140 C231 8E12D4               STX $D412
 3150 C234 4C31EA DONEALL       JMP $EA31               ! TESTER COMPLETE
 3160 C237        !
 3170 C237        ! ROUTINE TO PICK OFF NEW VALUE
 3180 C237        !
 3190 C237 A000   GETVOICE      LDY #$00                ! LOOP START
 3200 C239 B955C2 GET1          LDA INPUTTED,Y          ! GET VALUE
 3210 C23C F008                 BEQ GETNEXT             ! ZERO, IGNORE
 3220 C23E 48                   PHA
 3230 C23F A900                 LDA #$00                ! BLANK KEY
 3240 C241 9955C2               STA INPUTTED,Y
 3250 C244 68                   PLA
 3260 C245 60                   RTS                     ! RETURN WITH VALUE IN
A
 3270 C246 C8     GETNEXT       INY                     ! NEXT VALUE
 3280 C247 C4FB                 CPY $FB
 3290 C249 D0EE                 BNE GET1                ! CONTINUE
 3300 C24B A900                 LDA #$00                ! NO MORE VALUES
 3310 C24D 60                   RTS
 3320 C24E 10     WAVE          BYT $10                 ! WAVE FORM
 3330 C24F 00     VOICE1        BYT 0                   ! V1 VALUE
 3340 C250 00     VOICE2        BYT 0                   ! V2
 3350 C251 00     VOICE3        BYT 0                   ! V3
 3360 C252 00     V1FLAG        BYT 0                   ! V1 PLAY FLAG
 3370 C253 00     V2FLAG        BYT 0                   ! V2
 3380 C254 00     V3FLAG        BYT 0                   ! V3
 3390 C255 00     INPUTTED      BYT 0                   ! START OF INPUT TABLE
```

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Machine	BM1	BM2	BM3	BM4	BM5	BM6	BM7	BM8	Average
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IBM PC	1.5	5.2	12.1	12.6	13.6	23.5	37.4	3.5	17.6
Osborne 01	1.4	4.4	11.7	11.6	12.4	21.9	34.9	6.1	19.9
Apple 111	1.7	7.2	13.5	14.5	16.0	27.0	42.5	7.5	24.7
ACT Sirius 1	2.0	7.4	17.0	17.5	19.8	35.4	55.9	4.3	24.8
Apple 2	1.3	8.5	16.0	17.8	19.1	28.6	44.8	10.7	30.4
Commodore CBM 8032	1.7	10.0	18.4	20.3	21.9	32.4	51.0	11.9	34.3

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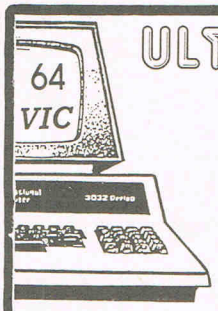

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Access

Keeping up-to-date

Do you forget important dates? Help has arrived in the form of a desk diary and calendar program written by G P Raven, which we are publishing in two parts

This program was written for the user who wants to put behind him the bad old days when he constantly forgot his wife's birthday and his wedding anniversary and when family birthdays and other important annual events regularly slipped his mind – I'm talking about me. It is a program which can be referenced daily to see what's on and to enter in appointments and other matters which must be remembered.

Each year the diary will carry forward all permanent entries such as birthdays, anniversaries, days when returns must be made etc but temporary entries referring to appointments etc which have already become obsolete can be deleted by using the REVISE facility.

Because of the limitations which 32k imposes on the number and size of sequential files that can be held in memory, the diary permits only 100 entries. This is, however, likely to be enough for most users since when the diary is full a prompt will ask you to REVISE and entries which are no longer required can be erased to make room for more. You can revise the diary at any time either for the whole year or for a period between two dates that may be entered in response to the prompts.

There is a facility to print (screen or hard copy) a calendar for any month of any year from 1900 to 2999. The current year is stored on disk and held in memory for reference by the diary. If the calendar for any other year is required then after reference to it is finished the program will automatically reload the calendar for the year of the diary.

The printer I use is a Commodore 4022. No allowance has been made in the program for any other type of printer. However, the experienced programmer will find no particular difficulty in altering the program (lines 157 to 175) to suit his own particular printer.

Since graphics are a problem on the 8000 series machines I have written a simple machine code routine to give the screen headings a touch of class-particularly for the individual pages of the diary. There is also another machine code routine for sorting. The routine I used was direct from Nick Hampshires Library of PET Subroutines which I suitably amended for basic 4.0. Those who don't want to use a machine code sort can insert their own favourite basic routine at line 316 and replace sys32314 where it occurs at lines 78,229,245 and 317 with "gosub 316". The array to sort is zs$(n-1).

The purpose of the sort is to keep all the entries in chronological order. The first three characters of the string that holds the diary entry are the day and month reduced to internal format at lines 295-299. The next four are the time according to the 24-hour clock. The sort therefore ensures that the entries appear in the array zs$() in date and time order.

The machine code routines must be entered via the MLM and saved on the same disk as the main program. The graphics routine is hidden away in page 1 at $0110 to $0131 which is against all the rules but it doesn't seem to interfere with anything there. The sort routing is at top of RAM which is moved to accommodate it at line 8 of the program.

When the desk diary is used for the first time on RUN the screen will inform you that there are NO ENTRIES in the diary and ask for an input of the year for which you want to open the diary. The program then calculates the calendar for that year and saves it on disk as a sequential file called "Diary". This process takes about 35 seconds. Subsequently whenever the diary is referenced the file "Diary" is read into memory straight away and there will be no more long waits unless you wish to see or print a calendar other than the one for which the diary is open.

There is as usual a menu of options:

1. Make an entry
2. Look at an entry
3. Search
4. Print Calendar
5. Revise Entries
6. Start New Diary

To make an entry you simply select 1. and follow the prompts at the bottom of the screen. The date input and validation routine requires the DD/MM/YY format (although it will accept D/M/YY) and the time must be the 24-hour clock. If the entry doesn't have a time such as a birthday just press return. The EVENT should be consistent each time you enter a similar event otherwise when searching you will not find them all. For example if you write "Birthday" sometimes and "birthday" on other occasions, when searching for "Birthdays" the program will not find any that were entered as "birthday". The details of the event should be kept to 30 characters or you will be reminded of that fact. The last prompt is whether or not the entry is permanent or temporary. Permanent entries obviously are those which remain the same each year and temporary ones are appointments/engagements etc which can be deleted at a later stage.

To look at an entry select 2. and the prompt will ask you for the date you wish to look at. Again the date input requires DD/MM/YY. That page of the diary will then be displayed showing all the entries in chronological order. The return to menu option is accomplished by pressing the escape key (chr$(27)). If you haven't got one, or prefer it, line 89 can be changed to read "if a$<>"e" then 95. Similarly elsewhere in the program.

Option 3, allows you to search for all the items recorded in the diary for a similar EVENT such as all the Birthdays or Dinner Engagements etc. Simply enter the Event and all entries which were originally entered for the same event will be displayed in date order on the screen. If there is more than a pageful the program will stop until the option to "continue" is taken. If there is

not then the option to "continue" will return you to the menu as will "escape". The search is made on the EVENT field of the records zs$(0) to zs$(n-1) and on the length of the input search string so that "Birth" will find "Birthday" or "Birthdays" and "App" will find "Appointment" etc.

Option 4, allows you to look at, or print, a calendar for any month or for the entire year. If the entire year option is chosen the calendar will be printed month by month waiting after each printout. There is an option to "escape" at any stage if you wish.

REVISE, option 5, allows you to revise the diary at any stage either for the entire year such as on 31st Dec. or when the diary is full when you may wish to revise only the first few Months. The Revise option deletes all temporary entries between the dates input and makes room for more. Following REVISION the program rewrites the "Entries" files to disk drive #0. At the end of a year the REVISE option can be used to start the diary for the following year. It will automatically calculate the calendar for the next consecutive year and write it to disk. At the same time the diary entries will be revised and rewritten to disk having erased ALL the temporary entries but preserving all the permanent ones for the new year.

Option 6 may be used if you wish to start a completely new diary and erase ALL the entries permanent or temporary. Don't forget that in a leap year you may have a PERMANENT entry on the 29th February. The REVISE procedure will not erase this and it will reappear whenever the calendar in memory is for a leap year. If the page for 29th Feb is selected the DATE INVALID prompt will appear except when yr = int (yr/4), ie a leap year.

The rest is the hard slog of typing in the program and de-bugging. I think you may find it worth while and at least will save you the cost of a new Desk Diary until the year 2999.

```
1 rem**********************************************
2 rem*                desk diary and calendar      *
3 rem*        program written by g.p.raven - jan 1984  *
4 rem*                                             *
5 rem**********************************************
6 ifathen8
7 a=1:dload"titles"
8 poke52,0:poke53,120:clr:ifpeek(32314)=72then10
9 dload"sort"
10 print"■":dimm$(12),d(12),wk$(7),da$(366):lp=0:nd=366:nc=0:n=0
   :v$=chr$(21):b$=chr$(7):dy=0:cl=0
11 dimzs$(100),ex$(15),ey$(45):nm$="Diary"
12 forx=1to12:readm$(x),d(x):nextx
13 forj=1to7:readwk$(j):nextj:f6=0
14 z1=32300:pokez1,asc("z"):pokez1+1,asc("s"):poke144,88:tp$="    *■■■"
15 bk$="■■■
```

```
40 bm$="For Which Date (DD/MM/YY)"+sp$+bk$+tp$:gosub359:inputdt$
41 ifdt$="*"thenprint"":goto40
42 gosub326:ifp6=1thenbm$="Date Invalid":wt=1:gosub361:goto38
43 f$(6)=dt$
44 gosub295:f$(1)=fi$
45 iflp=0theniffi=60thenbm$="Not a Leap Year":wt=1:gosub361
46 gosub340
47 bm$="c ontinue esc ape":gosub361
48 geta$:ifa$=""then48
49 ifa$="c"then52
50 ifa$=chr$(27)then20
51 ifa$<>"c"anda$<>chr$(27)then47
52 bm$="Time"+sp$+bk$+tp$:gosub359:inputf$(2)
53 iff$(2)="*"thenf$(2)="----"
54 iflen(f$(2))<>4thenbm$="24 Hour Clock":wt=1:gosub361:goto52
55 bm$="Event"+sp$+bk$+tp$:gosub359:inputf$(3)
56 iff$(3)="*"then55
57 iflen(f$(3))>15thenbm$="15 chars only":wt=1:gosub361:goto55
58 f$(3)=left$(f$(3)+"                              ",15)
59 bm$="Details"+sp$+bk$+tp$:gosub359:inputf$(4)
60 iff$(4)="*"then59
61 iflen(f$(4))>30thenbm$="30 chars only":wt=1:gosub361:goto55
62 f$(4)=left$(f$(4)+"                                                  ",30)
63 bm$="p ermanent t emporary":gosub359
64 geta$:ifa$=""then64
65 ifa$="t"thenf$(5)="t"
66 ifa$="p"thenf$(5)="p"
67 ifa$<>"t"anda$<>"p"then63
68 bm$="All Correct?   y":gosub359:inputyn$
69 ifleft$(yn$,1)<>"y"then38
70 forj=1to6:zs$(n)=zs$(n)+f$(j):next
71 en=en+1:ex$(en)=zs$(n):n=n+1:print""
72 forq=1toen
73 printmid$(ex$(q),4,4)spc(5)mid$(ex$(q),8,15)spc(10)mid$(ex$(q),23,30)
74 nextq
75 bm$="m ore e scape":gosub359
76 geta$:ifa$=""then76
77 ifa$="m"then52
78 ifa$=chr$(27)thensys32314:f6=1:return
79 ifa$<>"m"anda$<>chr$(27)then76
80 goto52
81 tt$="Diary "+y$+"- Entries":gosub294
82 bm$="For Which Date (DD/MM/YY)"+sp$+bk$+tp$:gosub359:inputdt$
83 ifdt$="*"thenprint"":goto40
84 gosub326:ifp6=1thenbm$="Date Invalid":wt=1:gosub361:goto82
85 f$(6)=dt$
86 gosub295:f$(1)=fi$
87 gosub340
88 bm$="esc ape":gosub359
89 geta$:ifa$<>chr$(27)then89
90 return
91 nn=0:q=1:qq=15:ifsh=1thenforj=1ton-1:ey$(j)="":next
92 tt$="Diary "+y$+" - Search":gosub294
93 bm$="Event":gosub359:inputev$
94 bm$="Searching Diary - wait!":gosub359
```

```
95 forj=1to45:ey$(j)="":next
96 forj=0ton-1
97 ifleft$(mid$(zs$(j),8,15),len(ev$))<>ev$then100
98 nn=nn+1:ey$(nn)=zs$(j)
99 ifnn=45thenj=n-1
100 nextj
101 ifnn=0thenbm$="■No "+ev$+"'s Recorded in Diary■":wt=1:gosub361:return
102 print"■■■"
103 print"■Date■          ■Event■                    ■Details■"
104 q5=0:forj=qtoqq
105 ifey$(j)=""theney$(j)=sp$:goto109
106 iflp<>1thenifval(left$(ey$(j),3))=60theney$(j)=sp$:goto109
107 printmid$(ey$(j),54,6);right$(y$,2);spc(5)mid$(ey$(j),8,15)spc(07);
108 printmid$(ey$(j),23,30)
109 nextj
110 ifnn>qqthenq=qq+1:qq=qq+15:q5=1
111 ifqq>45thenqq=45
112 bm$="■c■ontinue  ■esc■ape":gosub359
113 geta$:ifa$=""then113
114 ifa$="c"thenifq5=1then102
115 ifa$="c"thenifq5=0thensh=1:return
116 ifa$=chr$(27)thensh=1:return
117 ifa$<>"c"anda$<>chr$(27)then112
118 tt$="Print Calendar":gosub294:y3$=""
119 bm$="■For Which Year■"+sp$+bk$+tp$:gosub359:inputy3$
120 ify3$="*"then119
121 iflen(y3$)<>4then119
122 ify$=y3$then125
123 ny=1:bm$="■Calculating Calendar for "+y3$+" - Wait!■":gosub359
124 y8$=y$:y$=y3$:gosub277
125 bm$="■e■ntire year ■m■onth only ■esc■ape":gosub359
126 geta$:ifa$=""then126
127 ifa$=chr$(27)then206
128 ifa$="e"then145
129 ifa$="m"then131
130 ifa$<>"e"anda$<>"m"anda$<>chr$(27)then126
131 bm$="■Which Month■"+sp$+bk$+tp$:gosub359:inputmt$
132 ifmt$="*"then131
133 forj=1to12
134 ifmt$=left$(m$(j),len(mt$))thenmt=d(j):mx=j:goto137
135 nextj
136 goto131
137 gosub197
138 gosub176
139 bm$="■h■ard copy ■esc■ape":gosub359
140 geta$:ifa$=""then140
141 ifa$=chr$(27)then144
142 ifa$="h"thengosub157:goto144
143 ifa$<>"h"anda$<>chr$(27)then139
144 gosub206:return
145 sb=ss
146 forjk=1to12:mx=jk
147 gosub197:gosub176
148 bm$="■h■ard copy  ■c■ontinue  ■esc■ape":gosub359
149 geta$:ifa$=""then149
```

```
150 ifa$="c"then155
151 ifa$=chr$(27)then156
152 ifa$="h"then154
153 ifa$<>"h"anda$<>"c"anda$<>chr$(27)then149
154 gosub157
155 nextjk
156 gosub206:return
157 fg=0:open3,4,6:print#3,chr$(20)
158 open4,4:cmd4
159 forj=1to42:hh$(j)="**":next
160 printlz$m$(mx);y$:print
161 printlz$l1$:printlz$l4$:printlz$l2$:printlz$l4$:printlz$l5$
162 printlz$l4$
163 fg=d(mx)+sb-1
164 forj=1tosb-1:hh$(j)="**":nextj
165 forj=1tod(mx):hh$(j+sb-1)=mid$(str$(j)+"      ",2,2):next
166 ct=0:printspc(10)
167 forj=1to42
168 bn$=chr$(165)+"    "+hh$(j)+"  ":by$=chr$(165)
169 ifct=7thenct=0:printby$"■":printlz$l3$:printlz$l4$:printlz$;
170 printbn$;
171 ct=ct+1
172 nextj
173 printby$:printlz$l4$:printlz$l5$
174 print#4:close4:close3
175 return
176 print"■■■
```

```
205 return
206 ifval(y3$)<>yrthengosub254
207 return
208 nx=0
209 tt$="Diary "+y$+" - Revise Entries":gosub294
210 bm$="■e■ntire diary   ■p■art of diary  ■esc■ape":gosub359
211 geta$:ifa$=""then211
212 ifa$=chr$(27)then20
213 ifa$="e"then232
214 ifa$="p"then216
215 ifa$<>"p"anda$<>"e"anda$<>chr$(27)then210
216 bm$="■From (DD/MM/YY)■"+sp$+bk$+tp$:gosub359:inputdt$
217 ifdt$="*"then216
218 gosub326:ifp6=1thenbm$="■Date Invalid":wt=1:gosub361:goto216
219 d1$=dt$:gosub295:f1=fi
220 bm$="■To (DD/MM/YY)■"+sp$+bk$+tp$:gosub359:inputdt$
221 ifdt$="*"then221
222 gosub326:ifp6=1thenbm$="■Date Invalid■":wt=1:gosub361:goto220
223 d2$=dt$:gosub295:f2=fi
224 bm$="■Revising Diary for "+y$+" from "+d1$+" to "+d2$+"■":gosub359
225 forj=0ton-1
226 ifval(left$(zs$(j),3))<f1orval(left$(zs$(j),3))>f2then228
227 ifmid$(zs$(j),53,1)="t"thenzs$(j)="":n=n-1
228 nextj
229 sys32314
230 rv$="Revised ":gosub310:dy=1
231 bm$="■Revision Complete■":wt=1:gosub361:return
232 bm$="■c■urrent year ■n■ew year ■esc■ape":gosub359
233 geta$:ifa$=""then233
234 ifa$=chr$(27)then20
235 ifa$="c"then242
236 ifa$="n"thennx=1:gosub384:goto238
237 ifa$<>"n"anda$<>"c"anda$<>chr$(27)then232
238 ifleft$(yn$,1)<>"y"thennx=0:return
239 y1$=str$(val(y$)+1)
240 bm$="■Calculating Calendar for "+y1$+" - Wait!■":gosub359
241 y$=y1$:gosub279
242 forj=0ton-1
243 ifmid$(zs$(j),53,1)="t"thenzs$(j)="":n=n-1
244 nextj
245 sys32314
246 ifnx=1thengosub261
247 rv$="Revised ":gosub310:dy=1
248 bm$="■Revision Complete■":wt=1:gosub361:return
249 gosub384
250 ifleft$(yn$,1)<>"y"thenreturn
251 gosub272:gosub261:cl=1:scratch"Entries"
252 forj=0ton-1:zs$(j)="":next: return
253 ifcl=1thenreturn
254 dopen#8,(nm$):gosub355
255 ifds=62thennc=1:dclose#8:return
256 input#8,ss,nd,lp,y$
257 bm$="■Loading Calendar for "+y$+"■":gosub359
258 forj=1tond:input#8,da$(j):next
259 y=val(y$):ify/4=int(y/4)thend(2)=29
```

```
260 gosub355:dclose#8:cl=1:yr=val(y$):return
261 bm$="■Writing Calendar for "+y$+" to Disk Drive #0■":gosub359
262 dopen#8,(nm$),w:gosub355
263 ifds=63thendclose#8:scratch(nm$):goto262
264 print#8,ss
265 print#8,nd
266 print#8,lp
267 print#8,y$
268 forj=1tond
269 print#8,da$(j)
270 nextj
271 gosub355:dclose#8:cl=0:nc=0:return
272 tt$="Write New Calendar":gosub294:print"■"
273 bm$="■Enter Year of Diary■"+sp$+bk$+tp$:gosub359:inputy$
274 ify$="*"then20
275 iflen(y$)<>4then273
276 bm$="■Calculating Calendar for "+y$+" - Wait!■":gosub359
277 ify$="*"then      print"■■":goto275
278 iflen(y$)<>4thenprint"■■":goto275
279 ifval(y$)>1999theny1=2000
280 y1=1900:lp=0
281 y=val(y$):d=int((y-y1)/4)+(y-y1):s=d-int((d/7))*7
282 ify/4=int(y/4)thend(2)=29:lp=1
283 da=1:ifs=0thens=7:ss=s:goto285
284 s=s+1:ss=s
285 db=1:nm=1:forj=1tond
286 ifdb>d(nm)thennm=nm+1:db=1
287 da$(j)=mid$(str$(s),2,1)+mid$(str$(db)+"    ",2,2)
288 da$(j)=da$(j)+mid$(str$(nm)+"    ",2,2)
289 ifs=7thens=1:goto291
290 s=s+1
291 db=db+1
292 nextj
293 return
294 print"■":sys272:printspc((80-len(tt$))/2)tt$:return
295 fi=0:iflp=1thend(2)=29
296 forj=1topm:fi=fi+d(j-1):next
297 fi=fi+pd
298 fi$=right$("000"+right$(str$(fi),len(str$(fi))-1),3)
299 return
300 bm$="■Reading Diary Entries■":gosub32000
301 ifdy=1thenreturn
302 dopen#11,"Entries":gosub355
303 ifds=62thenbm$="■No Entries in Diary■":wt=1:gosub361
304 ifds=62thendclose#11:dy=1:return
305 input#11,n
306 forj=0ton-1:input#11,zs$(j):next
307 gosub355:dclose#11:dy=1:return
308 ru$=""
309 gosub316
310 scratch"Entries"
311 bm$="■Writing "+ru$+"Diary Entries■":gosub359
312 dopen#11,"Entries",w:gosub355
313 print#11,n
314 forj=0ton-1:print#11,zs$(j):next
```

Scrolling routine

This month we take a look at smooth scrolling on the 64.

There is no problem in scrolling to the eight locations available in the VIC chip register 22 – the problem comes when all of the characters have to be moved over and the register reset. This could not be done in Basic because it is too slow.

Therefore, the routine that follows is done in interrupts, raster interrupts to be precise. This produces a very smooth, flicker-free scroll.

In some games, in particular Killer Watt by Alligata, this smooth scrolling is done to fantastic effect with the smooth scrolling going in both directions and also with three different speeds in both directions, also a zero speed.

The speeds are controlled by the joystick in port 2 and are used in respect to a sprite moving against the flow of the scroll.

Another aspect to note about the routine is that the colour memory is not scrolled. This is due to the speed of the scrolling.

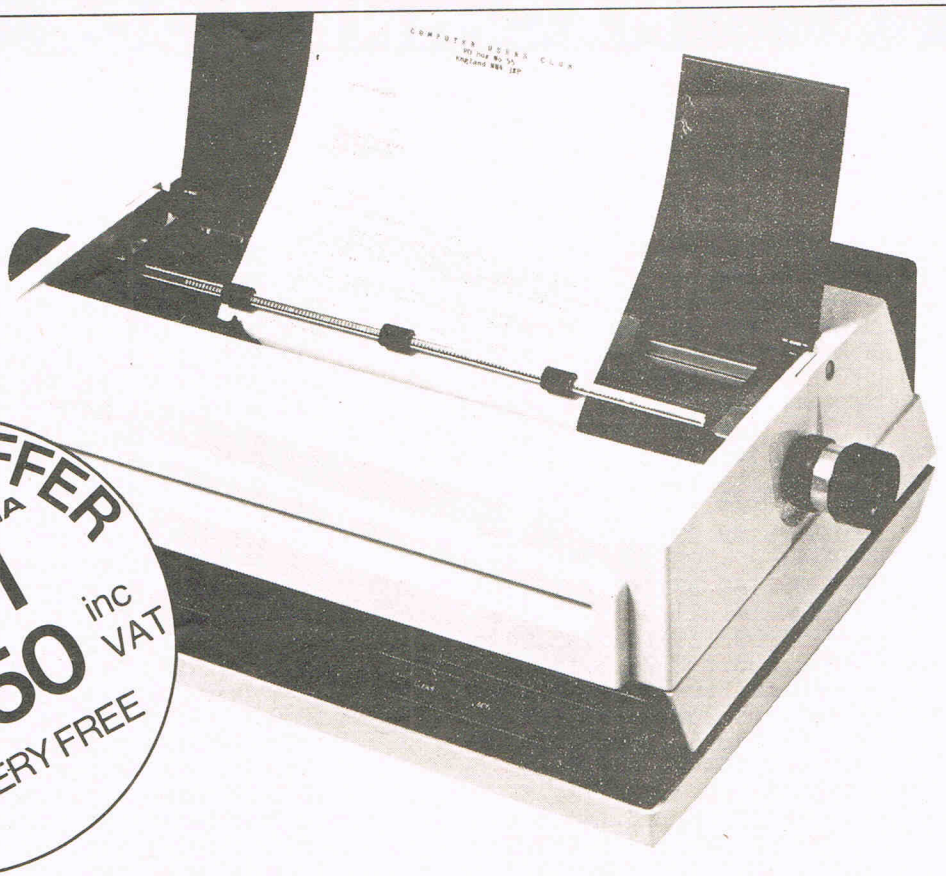
Sixteen lines are scrolled in all leaving the top five lines and the bottom four lines for stationary text, although it would be wise to leave the lines directly above and below the scrolling area blank.

The main difference between Killer Watts scrolling and this routine is that, in this routine, the display is scrolled onto the other side of the screen whereas in Killer Watt the display is brought in from an area of screen data.

The scrolling is initialised by SYS49152 and after that it will run independently of any other program.

```
10 I=49152:T=0
20 READA:IFA=-1THEN50
30 POKEI,A:I=I+1
40 T=T+A:GOTO20
50 IFT<>107175THENPRINT"■■CHECKSUM ERROR":END
60 IFI<>50068THENPRINT"■■DATA ERROR: NO. OF VALUES":END
70 PRINT"■■■DATA OK. START SCROLL WITH SYS49152"
80 END
100 DATA120,169,39,141,20,3,169
110 DATA192,141,21,3,173,17,208
120 DATA41,127,141,17,208,169,217
130 DATA141,18,208,173,26,208,9
140 DATA1,141,26,208,169,200,141
150 DATA22,208,88,96,169,1,44
160 DATA25,208,208,3,76,49,234
170 DATA173,145,195,240,65,173,142
180 DATA195,208,91,173,141,195,41
190 DATA7,205,143,195,240,13,173
200 DATA141,195,56,237,145,195,141
210 DATA141,195,76,119,192,173,144
220 DATA195,141,143,195,173,146,195
230 DATA141,145,195,169,1,141,147
240 DATA195,169,200,141,22,208,169
250 DATA199,141,141,195,160,1,32
260 DATA11,193,200,192,40,208,248
270 DATA169,1,141,25,208,169,200
280 DATA141,22,208,169,211,141,20
290 DATA3,169,192,141,21,3,169
```

```
300 DATA90,141,18,208,104,168,104
310 DATA170,104,64,173,141,195,41
320 DATA7,205,143,195,240,13,173
330 DATA141,195,24,109,145,195,141
340 DATA141,195,76,119,192,173,144
350 DATA195,141,143,195,173,146,195
360 DATA141,145,195,169,1,141,147
370 DATA195,169,200,141,22,208,169
380 DATA192,141,141,195,160,38,32
390 DATA108,193,136,16,250,76,119
400 DATA192,169,1,44,25,208,208
410 DATA3,76,49,234,173,141,195
420 DATA141,22,208,169,217,141,18
430 DATA208,169,39,141,20,3,169
440 DATA192,141,21,3,169,1,141
450 DATA25,208,173,142,195,208,6
460 DATA32,205,193,76,5,193,32
470 DATA48,194,104,168,104,170,104
480 DATA64,185,200,4,153,199,4
490 DATA185,240,4,153,239,4,185
500 DATA24,5,153,23,5,185,64
510 DATA5,153,63,5,185,104,5
520 DATA153,103,5,185,144,5,153
530 DATA143,5,185,184,5,153,183
540 DATA5,185,224,5,153,223,5
550 DATA185,8,6,153,7,6,185
560 DATA48,6,153,47,6,185,88
570 DATA6,153,87,6,185,128,6
580 DATA153,127,6,185,168,6,153
590 DATA167,6,185,208,6,153,207
600 DATA6,185,248,6,153,247,6
610 DATA185,32,7,153,31,7,96
620 DATA185,200,4,153,201,4,185
630 DATA240,4,153,241,4,185,24
640 DATA5,153,25,5,185,64,5
650 DATA153,65,5,185,104,5,153
660 DATA105,5,185,144,5,153,145
670 DATA5,185,184,5,153,185,5
680 DATA185,224,5,153,225,5,185
690 DATA8,6,153,9,6,185,48
700 DATA6,153,49,6,185,88,6
710 DATA153,89,6,185,128,6,153
720 DATA129,6,185,168,6,153,169
730 DATA6,185,208,6,153,209,6
740 DATA185,248,6,153,249,6,185
750 DATA32,7,153,33,7,96,173
760 DATA200,4,141,239,4,173,240
770 DATA4,141,23,5,173,24,5
780 DATA141,63,5,173,64,5,141
790 DATA103,5,173,104,5,141,143
800 DATA5,173,144,5,141,183,5
810 DATA173,184,5,141,223,5,173
820 DATA224,5,141,7,6,173,8
830 DATA6,141,47,6,173,48,6
840 DATA141,87,6,173,88,6,141
850 DATA127,6,173,128,6,141,167
860 DATA6,173,168,6,141,207,6
870 DATA173,208,6,141,247,6,173
880 DATA248,6,141,31,7,173,32
890 DATA7,141,71,7,76,147,194
900 DATA173,239,4,141,200,4,173
910 DATA23,5,141,240,4,173,63
920 DATA5,141,24,5,173,103,5
930 DATA141,64,5,173,143,5,141
940 DATA104,5,173,183,5,141,144
950 DATA5,173,223,5,141,184,5
960 DATA173,7,6,141,224,5,173
970 DATA47,6,141,8,6,173,87
980 DATA6,141,48,6,173,127,6
990 DATA141,88,6,173,167,6,141
1000 DATA128,6,173,207,6,141,168
1010 DATA6,173,247,6,141,208,6
1020 DATA173,31,7,141,248,6,173
1030 DATA71,7,141,32,7,76,7
1040 DATA195,173,147,195,208,1,96
1050 DATA173,0,220,41,4,240,13
1060 DATA173,0,220,41,8,240,48
1070 DATA169,1,141,147,195,96,173
1080 DATA145,195,240,24,74,208,6
1090 DATA141,145,195,76,167,194,141
1100 DATA146,195,141,144,195,206,144
1110 DATA195,169,0,141,147,195,96
1120 DATA169,1,141,142,195,169,7
1130 DATA141,143,195,76,167,194,173
1140 DATA145,195,201,4,240,201,201
1150 DATA0,240,12,10,141,146,195
1160 DATA141,144,195,206,144,195,201
1170 DATA0,208,17,169,1,141,145
1180 DATA195,141,146,195,169,0,141
1190 DATA143,195,141,144,195,96,169
1200 DATA0,141,147,195,96,173,147
1210 DATA195,208,1,96,173,0,220
1220 DATA41,8,240,10,173,0,220
1230 DATA41,4,240,62,76,167,194
1240 DATA173,145,195,240,41,74,208
1250 DATA9,141,145,195,169,1,141
1260 DATA147,195,96,141,146,195,201
1270 DATA2,208,8,169,6,141,144
1280 DATA195,76,70,195,141,146,195
1290 DATA169,7,141,144,195,169,0
1300 DATA141,147,195,96,169,0,141
1310 DATA142,195,169,0,141,143,195
1320 DATA76,167,194,173,145,195,201
1330 DATA4,240,42,201,0,240,22
1340 DATA10,141,146,195,201,4,208
1350 DATA6,141,144,195,76,70,195
1360 DATA169,6,141,144,195,76,70
1370 DATA195,169,1,141,145,195,141
1380 DATA146,195,169,7,141,143,195
1390 DATA141,144,195,76,167,194,199
1400 DATA0,0,0,1,1,1,-1
READY.
```



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```
  0  C000  78        SEI
  1  C001  A927      LDA  #$27
  2  C003  8D1403    STA  $0314
  3  C006  A9C0      LDA  #$C0
  4  C008  8D1503    STA  $0315
  5  C00B  AD11D0    LDA  $D011
  6  C00E  297F      AND  #$7F
  7  C010  8D11D0    STA  $D011
  8  C013  A9D9      LDA  #$D9
  9  C015  8D12D0    STA  $D012
 10  C018  AD1AD0    LDA  $D01A
 11  C01B  0901      ORA  #$01
 12  C01D  8D1AD0    STA  $D01A
 13  C020  A9C8      LDA  #$C8
 14  C022  8D16D0    STA  $D016
 15  C025  58        CLI
 16  C026  60        RTS
 17  C027  A901      LDA  #$01
 18  C029  2C19D0    BIT  $D019
 19  C02C  D003      BNE  $C031
 20  C02E  4C31EA    JMP  $EA31
 21  C031  AD91C3    LDA  $C391
 22  C034  F041      BEQ  $C077
 23  C036  AD8EC3    LDA  $C38E
 24  C039  D05B      BNE  $C096
 25  C03B  AD8DC3    LDA  $C38D
 26  C03E  2907      AND  #$07
 27  C040  CD8FC3    CMP  $C38F
 28  C043  F00D      BEQ  $C052
 29  C045  AD8DC3    LDA  $C38D
 30  C048  38        SEC
 31  C049  ED91C3    SBC  $C391
 32  C04C  8D8DC3    STA  $C38D
 33  C04F  4C77C0    JMP  $C077
 34  C052  AD90C3    LDA  $C390
 35  C055  8D8FC3    STA  $C38F
 36  C058  AD92C3    LDA  $C392
 37  C05B  8D91C3    STA  $C391
 38  C05E  A901      LDA  #$01
 39  C060  8D93C3    STA  $C393
 40  C063  A9C8      LDA  #$C8
 41  C065  8D16D0    STA  $D016
 42  C068  A9C7      LDA  #$C7
 43  C06A  8D8DC3    STA  $C38D
 44  C06D  A001      LDY  #$01
 45  C06F  200BC1    JSR  $C10B
 46  C072  C8        INY
 47  C073  C028      CPY  #$28
 48  C075  D0F8      BNE  $C06F
 49  C077  A901      LDA  #$01
 50  C079  8D19D0    STA  $D019
 51  C07C  A9C8      LDA  #$C8
 52  C07E  8D16D0    STA  $D016
 53  C081  A9D3      LDA  #$D3
 54  C083  8D1403    STA  $0314
 55  C086  A9C0      LDA  #$C0
 56  C088  8D1503    STA  $0315
 57  C08B  A95A      LDA  #$5A
 58  C08D  8D12D0    STA  $D012
 59  C090  68        PLA
 60  C091  A8        TAY
 61  C092  68        PLA
 62  C093  AA        TAX
 63  C094  68        PLA
 64  C095  40        RTI
 65  C096  AD8DC3    LDA  $C38D
 66  C099  2907      AND  #$07
 67  C09B  CD8FC3    CMP  $C38F
 68  C09E  F00D      BEQ  $C0AD
 69  C0A0  AD8DC3    LDA  $C38D
 70  C0A3  18        CLC
 71  C0A4  6D91C3    ADC  $C391
 72  C0A7  8D8DC3    STA  $C38D
 73  C0AA  4C77C0    JMP  $C077
 74  C0AD  AD90C3    LDA  $C390
 75  C0B0  8D8FC3    STA  $C38F
 76  C0B3  AD92C3    LDA  $C392
 77  C0B6  8D91C3    STA  $C391
 78  C0B9  A901      LDA  #$01
 79  C0BB  8D93C3    STA  $C393
 80  C0BE  A9C8      LDA  #$C8
 81  C0C0  8D16D0    STA  $D016
 82  C0C3  A9C0      LDA  #$C0
 83  C0C5  8D8DC3    STA  $C38D
 84  C0C8  A026      LDY  #$26
 85  C0CA  206CC1    JSR  $C16C
 86  C0CD  88        DEY
 87  C0CE  10FA      BPL  $C0CA
 88  C0D0  4C77C0    JMP  $C077
 89  C0D3  A901      LDA  #$01
 90  C0D5  2C19D0    BIT  $D019
 91  C0D8  D003      BNE  $C0DD
 92  C0DA  4C31EA    JMP  $EA31
 93  C0DD  AD8DC3    LDA  $C38D
 94  C0E0  8D16D0    STA  $D016
 95  C0E3  A9D9      LDA  #$D9
 96  C0E5  8D12D0    STA  $D012
 97  C0E8  A927      LDA  #$27
 98  C0EA  8D1403    STA  $0314
 99  C0ED  A9C0      LDA  #$C0
100  C0EF  8D1503    STA  $0315
101  C0F2  A901      LDA  #$01
102  C0F4  8D19D0    STA  $D019
103  C0F7  AD8EC3    LDA  $C38E
104  C0FA  D006      BNE  $C102
105  C0FC  20CDC1    JSR  $C1CD
106  C0FF  4C05C1    JMP  $C105
107  C102  2030C2    JSR  $C230
108  C105  68        PLA
109  C106  A8        TAY
110  C107  68        PLA
111  C108  AA        TAX
112  C109  68        PLA
113  C10A  40        RTI
114  C10B  B9C804    LDA  $04C8,Y
115  C10E  99C704    STA  $04C7,Y
116  C111  B9F004    LDA  $04F0,Y
117  C114  99EF04    STA  $04EF,Y
118  C117  B91805    LDA  $0518,Y
```

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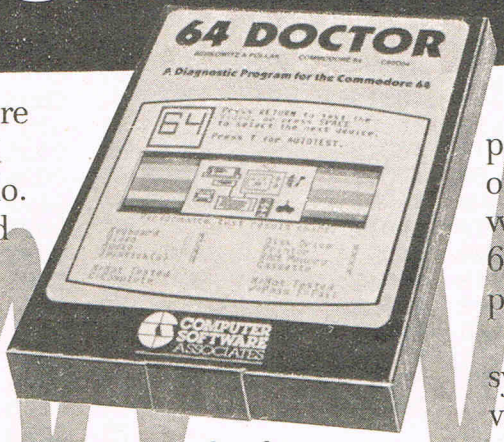

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```
119  C11A  991705    STA  $0517,Y
120  C11D  B94005    LDA  $0540,Y
121  C120  993F05    STA  $053F,Y
122  C123  B96805    LDA  $0568,Y
123  C126  996705    STA  $0567,Y
124  C129  B99005    LDA  $0590,Y
125  C12C  998F05    STA  $058F,Y
126  C12F  B9B805    LDA  $05B8,Y
127  C132  99B705    STA  $05B7,Y
128  C135  B9E005    LDA  $05E0,Y
129  C138  99DF05    STA  $05DF,Y
130  C13B  B90806    LDA  $0608,Y
131  C13E  990706    STA  $0607,Y
132  C141  B93006    LDA  $0630,Y
133  C144  992F06    STA  $062F,Y
134  C147  B95806    LDA  $0658,Y
135  C14A  995706    STA  $0657,Y
136  C14D  B98006    LDA  $0680,Y
137  C150  997F06    STA  $067F,Y
138  C153  B9A806    LDA  $06A8,Y
139  C156  99A706    STA  $06A7,Y
140  C159  B9D006    LDA  $06D0,Y
141  C15C  99CF06    STA  $06CF,Y
142  C15F  B9F806    LDA  $06F8,Y
143  C162  99F706    STA  $06F7,Y
144  C165  B92007    LDA  $0720,Y
145  C168  991F07    STA  $071F,Y
146  C16B  60        RTS
147  C16C  B9C804    LDA  $04C8,Y
148  C16F  99C904    STA  $04C9,Y
149  C172  B9F004    LDA  $04F0,Y
150  C175  99F104    STA  $04F1,Y
151  C178  B91805    LDA  $0518,Y
152  C17B  991905    STA  $0519,Y
153  C17E  B94005    LDA  $0540,Y
154  C181  994105    STA  $0541,Y
155  C184  B96805    LDA  $0568,Y
156  C187  996905    STA  $0569,Y
157  C18A  B99005    LDA  $0590,Y
158  C18D  999105    STA  $0591,Y
159  C190  B9B805    LDA  $05B8,Y
160  C193  99B905    STA  $05B9,Y
161  C196  B9E005    LDA  $05E0,Y
162  C199  99E105    STA  $05E1,Y
163  C19C  B90806    LDA  $0608,Y
164  C19F  990906    STA  $0609,Y
165  C1A2  B93006    LDA  $0630,Y
166  C1A5  993106    STA  $0631,Y
167  C1A8  B95806    LDA  $0658,Y
168  C1AB  995906    STA  $0659,Y
169  C1AE  B98006    LDA  $0680,Y
170  C1B1  998106    STA  $0681,Y
171  C1B4  B9A806    LDA  $06A8,Y
172  C1B7  99A906    STA  $06A9,Y
173  C1BA  B9D006    LDA  $06D0,Y
174  C1BD  99D106    STA  $06D1,Y
175  C1C0  B9F806    LDA  $06F8,Y
176  C1C3  99F906    STA  $06F9,Y
177  C1C6  B92007    LDA  $0720,Y
178  C1C9  992107    STA  $0721,Y
179  C1CC  60        RTS
180  C1CD  ADC804    LDA  $04C8
181  C1D0  8DEF04    STA  $04EF
182  C1D3  ADF004    LDA  $04F0
183  C1D6  8D1705    STA  $0517
184  C1D9  AD1805    LDA  $0518
185  C1DC  8D3F05    STA  $053F
186  C1DF  AD4005    LDA  $0540
187  C1E2  8D6705    STA  $0567
188  C1E5  AD6805    LDA  $0568
189  C1E8  8D8F05    STA  $058F
190  C1EB  AD9005    LDA  $0590
191  C1EE  8DB705    STA  $05B7
192  C1F1  ADB805    LDA  $05B8
193  C1F4  8DDF05    STA  $05DF
194  C1F7  ADE005    LDA  $05E0
195  C1FA  8D0706    STA  $0607
196  C1FD  AD0806    LDA  $0608
197  C200  8D2F06    STA  $062F
198  C203  AD3006    LDA  $0630
199  C206  8D5706    STA  $0657
200  C209  AD5806    LDA  $0658
201  C20C  8D7F06    STA  $067F
202  C20F  AD8006    LDA  $0680
203  C212  8DA706    STA  $06A7
204  C215  ADA806    LDA  $06A8
205  C218  8DCF06    STA  $06CF
206  C21B  ADD006    LDA  $06D0
207  C21E  8DF706    STA  $06F7
208  C221  ADF806    LDA  $06F8
209  C224  8D1F07    STA  $071F
210  C227  AD2007    LDA  $0720
211  C22A  8D4707    STA  $0747
212  C22D  4C93C2    JMP  $C293
213  C230  ADEF04    LDA  $04EF
214  C233  8DC804    STA  $04C8
215  C236  AD1705    LDA  $0517
216  C239  8DF004    STA  $04F0
217  C23C  AD3F05    LDA  $053F
218  C23F  8D1805    STA  $0518
219  C242  AD6705    LDA  $0567
220  C245  8D4005    STA  $0540
221  C248  AD8F05    LDA  $058F
222  C24B  8D6805    STA  $0568
223  C24E  ADB705    LDA  $05B7
224  C251  8D9005    STA  $0590
225  C254  ADDF05    LDA  $05DF
226  C257  8DB805    STA  $05B8
227  C25A  AD0706    LDA  $0607
228  C25D  8DE005    STA  $05E0
229  C260  AD2F06    LDA  $062F
230  C263  8D0806    STA  $0608
231  C266  AD5706    LDA  $0657
232  C269  8D3006    STA  $0630
233  C26C  AD7F06    LDA  $067F
234  C26F  8D5806    STA  $0658
235  C272  ADA706    LDA  $06A7
236  C275  8D8006    STA  $0680
```

```
237  C278  ADCF06    LDA  $06CF
238  C27B  8DA806    STA  $06A8
239  C27E  ADF706    LDA  $06F7
240  C281  8DD006    STA  $06D0
241  C284  AD1F07    LDA  $071F
242  C287  8DF806    STA  $06F8
243  C28A  AD4707    LDA  $0747
244  C28D  8D2007    STA  $0720
245  C290  4C07C3    JMP  $C307
246  C293  AD93C3    LDA  $C393
247  C296  D001      BNE  $C299
248  C298  60        RTS
249  C299  AD00DC    LDA  $DC00
250  C29C  2904      AND  #$04
251  C29E  F00D      BEQ  $C2AD
252  C2A0  AD00DC    LDA  $DC00
253  C2A3  2908      AND  #$08
254  C2A5  F030      BEQ  $C2D7
255  C2A7  A901      LDA  #$01
256  C2A9  8D93C3    STA  $C393
257  C2AC  60        RTS
258  C2AD  AD91C3    LDA  $C391
259  C2B0  F018      BEQ  $C2CA
260  C2B2  4A        LSR  A
261  C2B3  D006      BNE  $C2BB
262  C2B5  8D91C3    STA  $C391
263  C2B8  4CA7C2    JMP  $C2A7
264  C2BB  8D92C3    STA  $C392
265  C2BE  8D90C3    STA  $C390
266  C2C1  CE90C3    DEC  $C390
267  C2C4  A900      LDA  #$00
268  C2C6  8D93C3    STA  $C393
269  C2C9  60        RTS
270  C2CA  A901      LDA  #$01
271  C2CC  8D8EC3    STA  $C38E
272  C2CF  A907      LDA  #$07
273  C2D1  8D8FC3    STA  $C38F
274  C2D4  4CA7C2    JMP  $C2A7
275  C2D7  AD91C3    LDA  $C391
276  C2DA  C904      CMP  #$04
277  C2DC  F0C9      BEQ  $C2A7
278  C2DE  C900      CMP  #$00
279  C2E0  F00C      BEQ  $C2EE
280  C2E2  0A        ASL  A
281  C2E3  8D92C3    STA  $C392
282  C2E6  8D90C3    STA  $C390
283  C2E9  CE90C3    DEC  $C390
284  C2EC  C900      CMP  #$00
285  C2EE  D011      BNE  $C301
286  C2F0  A901      LDA  #$01
287  C2F2  8D91C3    STA  $C391
288  C2F5  8D92C3    STA  $C392
289  C2F8  A900      LDA  #$00
290  C2FA  8D8FC3    STA  $C38F
291  C2FD  8D90C3    STA  $C390
292  C300  60        RTS
293  C301  A900      LDA  #$00
294  C303  8D93C3    STA  $C393
295  C306  60        RTS
296  C307  AD93C3    LDA  $C393
297  C30A  D001      BNE  $C30D
298  C30C  60        RTS
299  C30D  AD00DC    LDA  $DC00
300  C310  2908      AND  #$08
301  C312  F00A      BEQ  $C31E
302  C314  AD00DC    LDA  $DC00
303  C317  2904      AND  #$04
304  C319  F03E      BEQ  $C359
305  C31B  4CA7C2    JMP  $C2A7
306  C31E  AD91C3    LDA  $C391
307  C321  F029      BEQ  $C34C
308  C323  4A        LSR  A
309  C324  D009      BNE  $C32F
310  C326  8D91C3    STA  $C391
311  C329  A901      LDA  #$01
312  C32B  8D93C3    STA  $C393
313  C32E  60        RTS
314  C32F  8D92C3    STA  $C392
315  C332  C902      CMP  #$02
316. C334  D008      BNE  $C33E
317  C336  A906      LDA  #$06
318  C338  8D90C3    STA  $C390
319  C33B  4C46C3    JMP  $C346
320  C33E  8D92C3    STA  $C392
321  C341  A907      LDA  #$07
322  C343  8D90C3    STA  $C390
323  C346  A900      LDA  #$00
324  C348  8D93C3    STA  $C393
325  C34B  60        RTS
326  C34C  A900      LDA  #$00
327  C34E  8D8EC3    STA  $C38E
328  C351  A900      LDA  #$00
329  C353  8D8FC3    STA  $C38F
330  C356  4CA7C2    JMP  $C2A7
331  C359  AD91C3    LDA  $C391
332  C35C  C904      CMP  #$04
333  C35E  F02A      BEQ  $C38A
334  C360  C900      CMP  #$00
335  C362  F016      BEQ  $C37A
336  C364  0A        ASL  A
337  C365  8D92C3    STA  $C392
338  C368  C904      CMP  #$04
339  C36A  D006      BNE  $C372
340  C36C  8D90C3    STA  $C390
341  C36F  4C46C3    JMP  $C346
342  C372  A906      LDA  #$06
343  C374  8D90C3    STA  $C390
344  C377  4C46C3    JMP  $C346
345  C37A  A901      LDA  #$01
346  C37C  8D91C3    STA  $C391
347  C37F  8D92C3    STA  $C392
348  C382  A907      LDA  #$07
349  C384  8D8FC3    STA  $C38F
350  C387  8D90C3    STA  $C390
351  C38A  4CA7C2    JMP  $C2A7
352  C38D  C7        BYT  $C7
353  C38E  00        BRK
354  C38F  00        BRK
355  C390  00        BRK
356  C391  0101      ORA  ($01,X)
357  C393  00        BRK
READY.
```

VIZASTAR 64

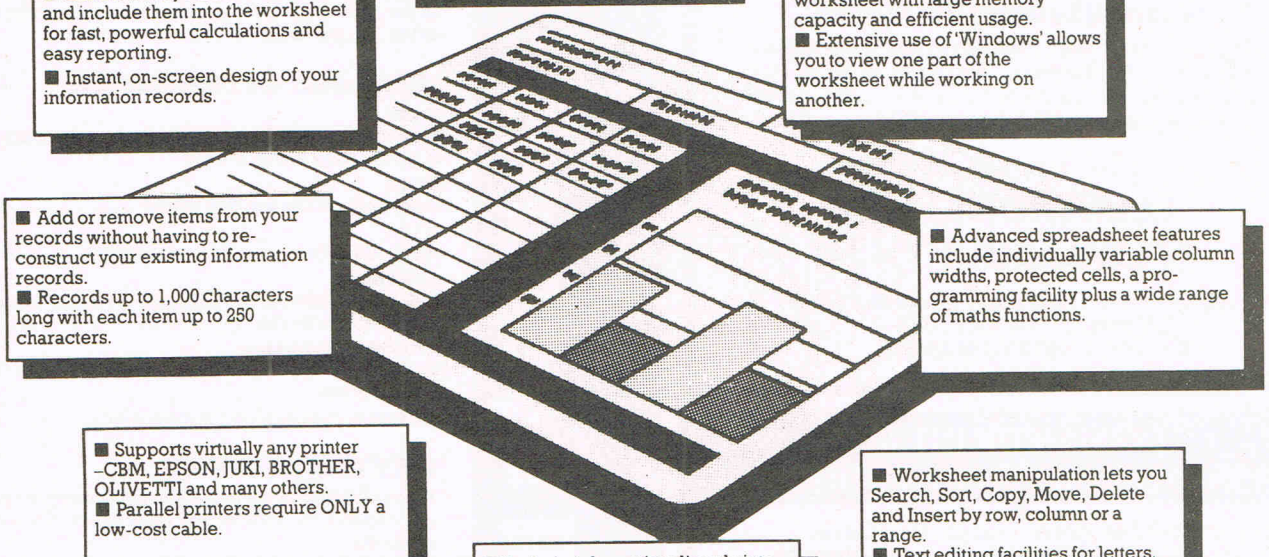
THE INFORMATION PROCESSOR

■ Spreadsheet ■ Database ■ Graphics

■ One word menu lines for easy selection of facilities.
■ The high resolution grid pattern frames the worksheet giving an easy-to read display.

■ Extract from your information files and include them into the worksheet for fast, powerful calculations and easy reporting.
■ Instant, on-screen design of your information records.

■ A 1000 Row by 64 Column wide worksheet with large memory capacity and efficient usage.
■ Extensive use of 'Windows' allows you to view one part of the worksheet while working on another.



■ Add or remove items from your records without having to re-construct your existing information records.
■ Records up to 1,000 characters long with each item up to 250 characters.

■ Advanced spreadsheet features include individually variable column widths, protected cells, a pro-gramming facility plus a wide range of maths functions.

■ Supports virtually any printer –CBM, EPSON, JUKI, BROTHER, OLIVETTI and many others.
■ Parallel printers require ONLY a low-cost cable.

■ Worksheet manipulation lets you Search, Sort, Copy, Move, Delete and Insert by row, column or a range.
■ Text editing facilities for letters, invoices, report headings etc.

■ Include information directly into the Worksheet from VizaWrite and almost any other system.
■ Simultaneous display of work-sheet and line or bar graphs.

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A fast and easy-to-use package – VizaStar is a comprehensive information processor that includes an electronic worksheet, information filing system and simultaneous on-screen graphics.

VizaStar has been designed to incorporate the very latest in user-friendliness – so now you can handle your all-important information in many new ways and in a quick and effective manner.

The information filing capabilities of VizaStar enable you to store your information onto disk in an ordered and instantly retrievable form. This means that you can quickly pick out individual or entire groups of related information to create lists, statements, labels or reports.

VizaStar is the ONLY program of its kind on the Commodore 64. Completely consistent with the VizaWrite word processor, VizaStar provides a totally comprehensive office system.

VizaStar costs just £99.95 (incl. VAT) from your computer dealer and selected stores. Please write for more details and the name and address of your nearest dealer.

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Six control commands	.SAVE	.LOAD	.DISPLAY
(executed by function keys)	.STOP	.ERASE	.CONVERT

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Reproduces the content of the PET screen on a TV or video monitor £46

RS232 to 20 mA current loop adaptor £25

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The **HARDBOX** is the intelligent controller that lets you add a CORVUS hard disk drive to your Commodore computer.

- PET DOS 1 and 2 compatibility.
- Multi-user capability with file and record locking, passwords.
- 16 Mb max file size and up to 65535 records per relative file.
- 2000 files on 6 Mb drive.
- Access to 6, 10, 20 Mb drives with video tape backup.

SIRIUS/VICTOR 9000 CARD

This card now being manufactured under licence by Sirius Systems Technology allows the Sirius/Victor to run any standard CP/M 80 program without modification.

- Specification as per the IBM 80 CARD

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Cross Assemblers for most popular microprocessors £145
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Small Systems also carry a comprehensive range of microcomputer software. For detailed information on this or any of the above products ring 01-328 7145.

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Printer

Hewlett-Packard's model 2934A is a newsletter quality printer. It costs £2,327 and, with the IEEE 488 interface option, it is compatible with the Commodore 8000 series.

Capable of three printing speeds; 40, 60 and 200 cps, it can produce dot addressable graphics. Nine type styles are available with plug-in cartridges and print enhancements include justification, centring and proportional spacing. The normal line length is 136 characters, but this can vary from 68 to 223. Underlining and three character 'pitches can be used for emphasis. Data receive rates are selectable up to 19,200 buad.

Contact: Rapid Recall Ltd, Rapid House, Denmark Street, High Wycombe. Tel: 0494 26271.

Adcomp

Adcomp (UK), a subsidiary of Adcomp GmbH of Munich, are now responsible for the distribution of Adcomp products in the UK.

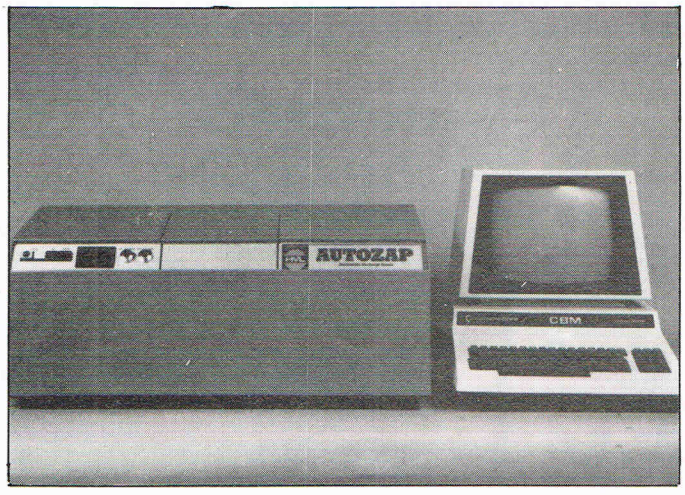
Hard disk systems for Commodore computers and a colour printer/plotter are their main products. The AP18 hard disk was originally distributed by IMI Computing Ltd.

Contact: Adcomp (UK) Ltd, 56 Long Street, Dursley, Glos. Tel: 0453 46496.

Expand

To complement their 160K expansion board for the 8000 series, SM Software will be introducing and negotiating new 160K software. SM-Text 160 with up to 1100 lines free for text plus some other famous name programs will be available in the near future.

Contact: SM Software, Raglan House, 56 Long Street, Dursley, Glos. Tel: 0453 46065.



Test ESD sensitivity

Anyone anxious to test ESD sensitivity in their semi conductors will be interested in the Autozap 200. It is software controlled and runs on the 8032.

The latest model range is the series 326 which can be used as complete DC supplies for medium precision applications or as pre-regulators in high precision DC supplies for transmitters, high power lasers and X-ray systems for example. Safety features such as an external interlock circuit for customers, door and panel interlocks and AC supply interlocks are incorporated. They cost about £13,500 each.

Contact: Hartley Measurements Ltd, Unit 4, Bear Court, Daneshill East, Basingstoke, Hants RG24 0QT. Tel: 0256 56695.

Database

Saxon Computing have released Figaro 64, a numeric database system for the 64, on disk and priced at £86.25.

Data can be maintained and displayed in a wide variety of graphic styles including bar charts, line charts and pie charts. Text and hi-res graphics can be mixed on the screen. Features include built in statistics, calculating routines, seasonal forecasting and data security is provided by back up routines.

Saxon claim that it will be suitable for sales and marketing applications as well as more specialised fields such as biology and meteorology.

Contact: Saxon Computing, 41 Brighton Road, Godalming, Surrey GU7 1NT. Tel: 04868 4599.

On offer

Impex Designs are offering Word Manager, Plan Manager and a mail merge program for the 64 and VIC 20, free with the Video Pak 80 – an 80 column upgrade costing £145.95.

Word Manager is a word processing package and Plan Manager, a spreadsheet program can handle up to 63 columns, 245 rows and calculates to 11 digits of precision. It will perform all the basic mathematical functions and with the print option the full spreadsheet, restricted cells or just the spreadsheet model can be printed. Full use is made of the Commodore function keys in both programs.

Contact: Impex Software, Metro House, Second Way, Wembley, Middx. HA9 0TY. Tel: 01 900 0999.

Solve it

Davidson Richards have set up a service called the Communications Solution. Anyone with problems instituting a viable communications system using their equipment can get advice on what products and interfaces will be needed.

Each client is treated individually and will be advised on a package to suit them. A typical pack includes modems, software, interfaces cables. The Commodore computers can be connected to mainframes as well as mini computers.

Contact: Davidson Richards Ltd, Systems House, 29 Charnwood House, Derby DE1 2GU. Tel: 0332 383231.

Mr Chip range

Mr Chip have now moved into the business software market with the launch of an accountancy package aimed at small to medium-sized businesses. Designed for use with the 64, the seven programs making up the package can be purchased individually or as a package. Available on cassette or disk, the programs cost £25 each. For those interested in purchasing the complete package, Mr Chip are offering a saving of £35 bringing the price of the package down to £115.

The programs making up Mr Chip's accountancy package are the Accounts Package, Purchase Ledger, Sales Ledger, Sales Journal, Purchase Analysis, Sales Analysis, and Final Accounts.

Contact: Mr Chip Software, 9 Caroline Road, Llandudno, Gwynedd, North Wales. Tel: 0492 79026.

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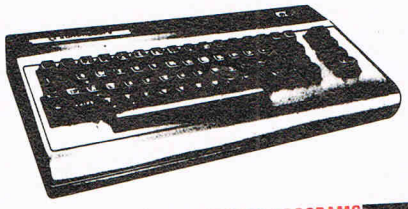

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c Commodore 64 Games Book £6.95
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c Easy Programming for 64 ..... £6.95
c Commodore 64 Machine Code Master £6.95
c Commodore 64 Adventures £5.95
c Commodore 64 – Getting the most from it (Tim Onosko) £7.95
c Commodore 64 User's Guide £11.00
c Computer Playground Commodore 64/Vic 20 ..... £12.70

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Microguide £5.95
b Superbase 64 ..... £99.95
c Petspeed £50.00
c Calc Result SX64 ..... £99.00
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b Mon 64 ..... £39.95
b Sales Ledger by Anagram £75.00
b Purchase Ledger by Anagram £75.00
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b Bridge 64 ..... £29.95
b Omnicalc £50.35
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64 Work-horses

If you're a businessman who's picked up a copy of this magazine to find some guidance about which computer to buy then read this.

Perhaps you've been pondering the advantages of having a computer which would enable you to find out quickly what would happen to your sales if you put up prices by 10 per cent. Perhaps you've been worried about the possible effects of an increase in your labour costs.

You will undoubtedly have had advice about buying computer systems that cost between £1,000 and £5,000. Pause for a while and consider the possibilities of the Commodore 64. OK cynics, you can stop sniggering now. You obviously haven't seen Microsoft's Multiplan.

It's the sort of product that pays an incredible compliment to the 64. As is obvious from the references and the illustrations in the manual, Multiplan was previously written for the Apple and it's a surprisingly big, serious business program.

The point is, of course, that to a huge degree – and especially in business – the computer is only as good as its software. Microsoft and others who have provided good quality business software for the machine have been gradually upgrading the 64 so that it becomes a genuinely inexpensive but viable alternative to bigger machines costing much more. There may be those who believe that Commodore don't really deserve it. But they did produce the 64 in the first place!

It seems to be a huge program, marvellously flexible. This is undoubtedly due to the program's use of the disk drive which seems to be constantly accessed. In spite of the notorious slow speed of the 1541 the program did not seem to be slowed down at all. It's difficult to see how, in most of the tasks, anyone could wish for anything quicker.

It's been made as simple as possible but anything this big is certain to take a while to get used to and I would imagine that one would need to be using it for months to become entirely familiar with it and explore it fully.

£89.91 buys you what is probably the best spreadsheet software for the 64 on the market – you would certainly have problems finding anything similar at a similar price. Presumably if you've read this far you will know what a spreadsheet is but for new business people a spreadsheet is simply a sheet of paper with rows and columns. Accountants will know the format well. They're forever working out figures on huge sheets of squared paper which are the equivalent of Multiplan's worksheet. Where any electronic worksheet wins out over the manual method is that the electronic worksheet has an enormously powerful calculator built in – change one number on the sheet and all the other figures which may be affected will change before your very eyes! Change the figure in the costs column, for instance, and you'll see how your profits will be affected. Such a tool has obvious uses in forecasting and planning.

Multiplan is described as a worksheet but spreadsheet might be a more familiar word for many business users. Imagine a huge sheet of paper 255 rows deep and 64 columns wide. That's the total extent of one Multiplan worksheet. But the screen of your 64 only acts as a window on to part of that at a time – a part that's four columns wide and 18 rows deep. On the original Apple version the window is seven columns wide and 20 rows deep.

Why is Multiplan different from other spreadsheets? It has tremendous flexibility. You can, for instance, connect and disconnect worksheets. You can even view parts of different worksheets on the same screen.

The size of the 64's memory is obviously one of the main reasons why Microsoft felt able to adapt Multiplan for the 64. But Multiplan may still surprise you with its size. It's fine having a marvellously sophisticated program but what if it takes up too much of the computer's memory? Such a business program would leave you no room for work. One of the ways that Microsoft get over this is by accessing the disk – a request for Help, for instance, sets the drive whirring busily. In fact, Multiplan takes up 437 blocks on the disk (leaving 227 free for your own files).

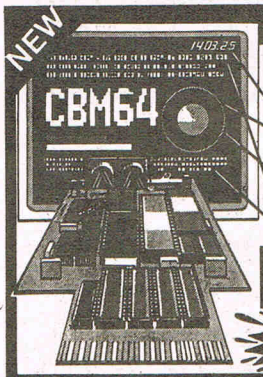
The big test of any software is, of course: Does it work? The first time I used it something went very wrong. A row of !!!!!!!! appeared instead of numbers after I had attempted to give values to all numbers. But I'm quite prepared to admit that it was all my fault since Multiplan worked without a hitch on all other occasions.

Multiplan may seem daunting at first but is very user friendly once you know your way round it. An enormous amount of work has been put into making it as simple as possible. It's not quite idiot proof but one of its great advantages is that you don't necessarily have to be familiar with computers to use it. The documentation is a tremendous help – it is some of the best that we've seen. There are 187 pages of tutorial and 238 pages of reference. It explains clearly and simply what is happening and what you need to do to make something else happen. The 'HELP' file of Multiplan is available all the time and will give you the appropriate advice for the part of the program in which you're stuck so there's no need to go through a whole file before finding the right place.

One of the most impressive aspects of Multiplan is the obvious effort that Microsoft have made to produce something of quality.

Even the perspex case it comes in can be converted into an 'EaselBox' – with the top folded down it's a bookstand to support the manual or the top can be removed to form a separate bookstand while the box can be used for storage. The EaselBox idea shows what thought has been put into the product.

NEW



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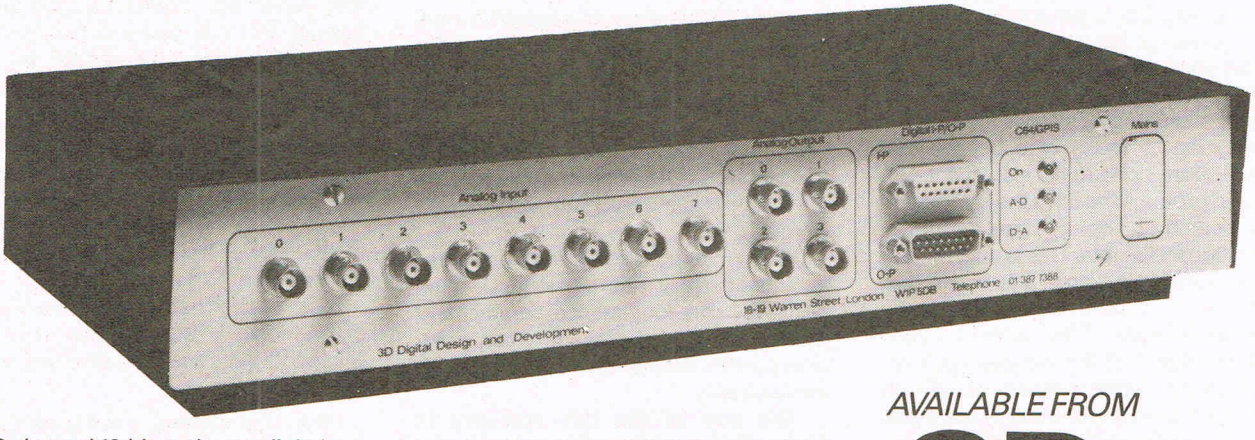

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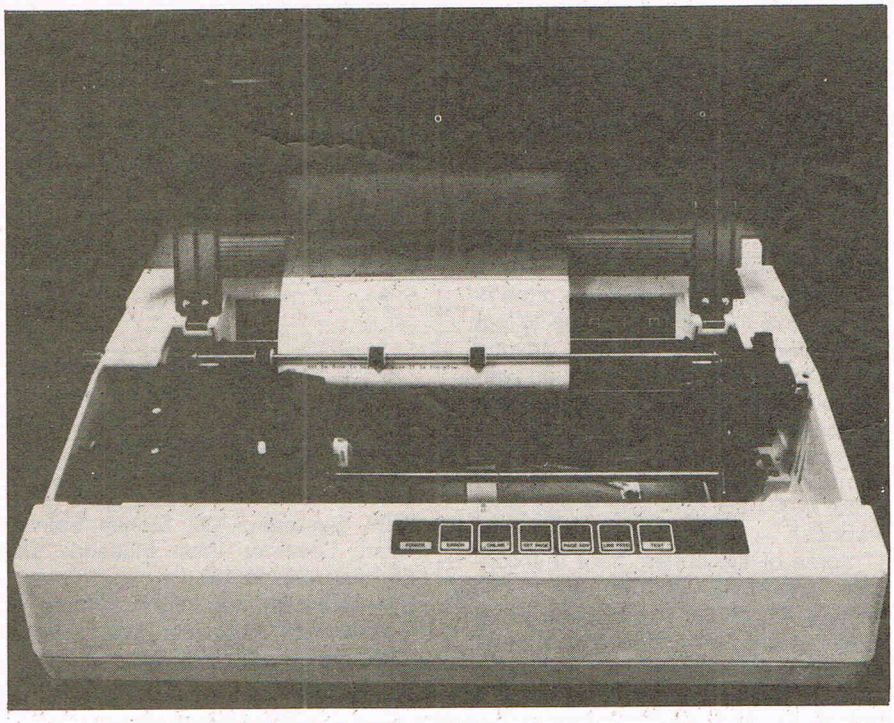
Cheap but not nasty

This month we look at Keyaki's daisy wheel printer and find that despite its low cost it retains all necessary features



The Daisy Step 2000 claims to be a fully-featured low cost daisy wheel printer and we could find nothing to contradict that. The only drawback with this version is that an interface will be needed and the additional cost will have to be considered if you are thinking about budgets. It produces very good quality print outs and although it isn't one of the faster daisy wheel printers on the market, 18 cps isn't slow. It is also quiet which is an advantage in a work environment.

The push buttons on the panel at the front of the printer are touch sensitive and the four indicators turn red to indicate if the power is on, if there is an error, if the printer is ready to accept information and also when the test routine is being run. The other three controls clear the line counter, set the top of the form (TOF), feed the next piece of paper to the TOF and advance the paper line by line. The controls needed to select the distance between each line, the length of page, the character size and the strength or print are located in the DIP switch at the back of the printer.

With this printer many of the controls will only work if you are using software that recognises them. For instance the printer can cope with the following features but needs to be programmed: subscripts and superscripts; horizontal and vertical tabs and proportional spacing.

The printer is accompanied by manual, print wheel, ribbon cartridge and a power cable. It proved exceptionally easy to fit the daisy wheel and ribbon cartridge – a bonus if you are used to complicated ribbon loading mechanisms. It can print up to four copies and there is an optical tractor feed mechanism or single sheet feeder available for the printer.

The Daisy Step 2000 is worth considering if you or your business needs good quality print for letters and other word processing applications. It is also comparatively easy to use.

N.B. IBEK Systems are producing a 64 version of this printer and it is due for release at the end of April for about £319. There are a few features especially developed for the 64, for example Commodores normal programmable listing codes will be translated by the printer as readable English codes ([CR] for cursor right)

Contact: IBEK Systems, 437 Stoney Stanton Road, Coventry, West Midlands CV6 5EA. Tel: 0203 661162.

Product Name:
Daisy Step 2000

Product:
Daisy wheel printer

Supplier:
Keyaki Ltd, Enterprise House, 42-44 Terrace Road, Walton-on-Thames KT12 2SD Tel: 0932 242777

Specifications:
Speed: 16 cps
Uses Qume ribbons and daisy wheels
Bidirectonal logic seeking printing
12, 14 and 18 cpi
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13 inch maximum paper width
Software controlled proportional spacing
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Interface options:
8-bit parallel Centronics
RS 232 C
12-bit parallel

Applications:
Word processing

Documentation:
Detailed manual written in English, German, French and Spanish

Price:
£289 = VAT

Buffer them up

In this month's product survey we look at a selection of printer buffers which enable you to continue using your computer while printing out

Anyone with a printer will understand the frustration of standing around staring at the screen while the printer is busy producing hard copy. The computer is effectively redundant while the printer is in use – not such a problem for the home user perhaps, but a real headache for many businesses.

This is where the printer buffer comes in. All the data waiting to be printed is stored in the buffer's RAM in seconds, freeing the computer and other equipment for other tasks. The buffer then feeds the data to the printer so it can print at its own pace.

In the old days people who wanted a fast printer chose dot matrix, but in doing so often sacrificed the letter quality of the slower daisy wheel. The Commodore 1361 dot matrix operates at 150 cps (characters per second) whereas the daisy wheel Commodore 6400 runs at 40 cps. With a printer buffer installed between the printer and any of the Commodore computers, the printer's speed is largely irrelevant.

Printer Buffers are available in two forms: standalone and on a printed circuit board which slots into the back of the printer. Most of the board buffers are designed for the Epson printers. Not all printers are directly compatible with Commodore and a lot of them have Parallel Centronics or RS 232 C interfaces, so if you are thinking of investing, check that the printer buffer has the appropriate specifications. For instance if you have a Pet and a parallel printer you will need an IEEE to Parallel buffer.

Some printers have a buffer of up to 16K built in, but there are some disadvantages with these. Pressing the button on the printer has no effect until the buffer is empty, so if the paper jams, the information still has to be printed out and the text re-run to get a perfect copy. Printer interfaces often have a buffer function attached to them, whereas the printer buffer has a small interfacing capability.

The size of the buffer's memory varies – the larger the memory the more text can be stored before being printed out. A 2K buffer will only store 2,000 characters (400 words if you take the average word length to be five characters long) whereas a 32K buffer can hold up to 32,000 characters (6,400 words). Buffers can usually be expanded by attaching additional memory.

In most business situations, time is money and it is advantageous to get things done quickly. However, anyone with a printer will prefer to get on with the job right away rather than hang around wasting time. Printing out 32,000 characters on a 160 cps printer would normally take about 17 minutes, but with a 32K buffer, the computer is free in 64 seconds!

Some of the buffers have a secondary addressing function and this enables the printer to deal with programs requiring more than 256 different characters on the print out. Most of the ready made business software will not need to use it, but Commodore's own software, educational and scientific software and also programs that people have written themselves will benefit from this facility.

Some of the buffers in the survey will need interfaces as they are not compatible with Commodore machines without one.

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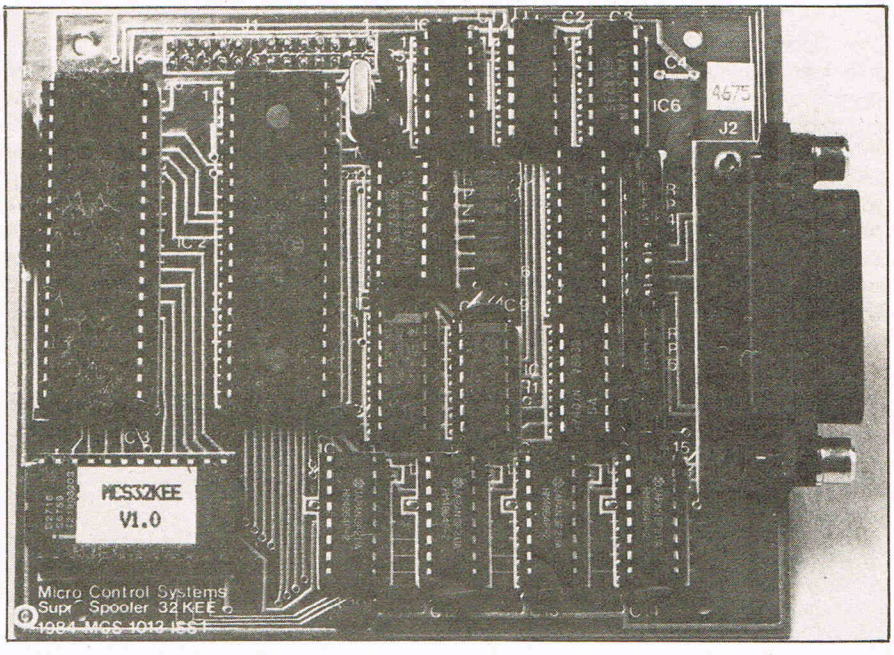
Interface Systems: Interface House, 17 Eversley Road, Bexhill-on-Sea, E. Sussex TN40 1HA. Tel: 0424 225683.



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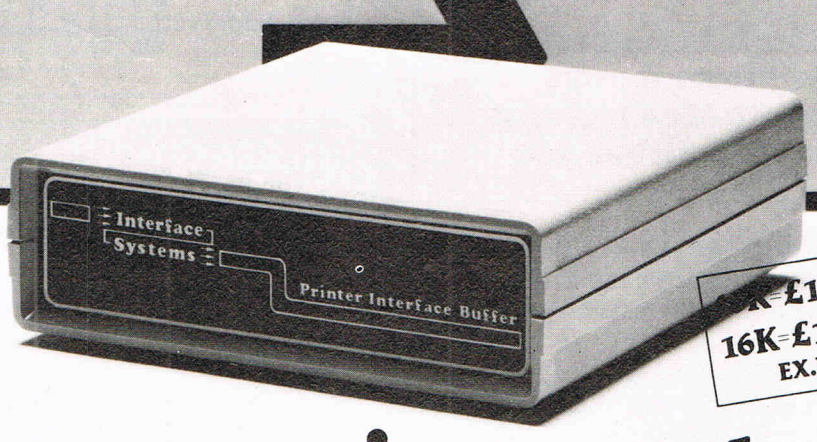

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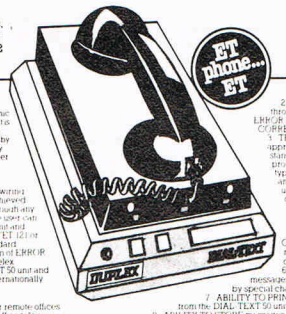

DIAL TEXT 50 is a simple to use electronic typewriter (ET) to electronic typewriter communications device. It is plug compatible with the OCTET 121 and HERMIT 21 interfaces designed by Duplex and can also be used with any RS232 device such as a microcomputer or printer.

Simple to install

Installation is easy and no special wiring is required. communication is achieved by simple cable connection or through any acoustic coupler. For instance, the user can simply place the DIAL TEXT 50 unit and acoustic coupler between an OCTET 121 or HERMIT 21 typewriter and a standard telephone handset for transmission of ERROR FREE letters and documents (or telex messages) to a remote DIAL TEXT 50 unit and acoustic coupler, nationally or internationally.

Typical application

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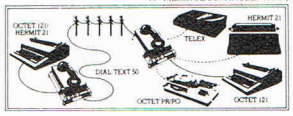

The DUPLEX SUSS-BOX and DUPLEX SUSS-ADAPTOR have been designed to enable the less skilled computer user to have a better understanding of the correct working connection between a computer and a peripheral, such as a printer. That is achieved by using the commonly used signals (wires) of the RS232C serial data cable specification, a matrix block and special connector pins. By inserting the connector pins into the SUSS-BOX's matrix block at the axis of the incoming signals the user can quickly establish a firm connection. The signals are routed into the SUSS-Box by two 25 way D type connectors, 1 × female, 1 × male. The SUSS-BOX also provides a lamp for each signal to show its condition when connected in line, ie High or Low.

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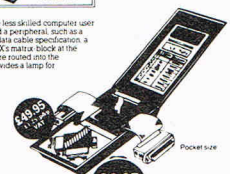
SUSS BOOK (2nd edition)

If the user specifically wishes to connect a microcomputer to the OCTET or HERMIT typewriter/printer than refer to DUPLEX's SUSS BOOK for details on various microcomputer cable Pin outs.



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Memory	16K, 48K and 96K	16K, 48K and 96K
Specifications	IEEE – IEEE	IEEE – Centronics
Features	Primary addressing Secondary addressing Dimensions: 5x 5.25 x 1.5 inches	Primary addressing Longer cables Dimensions: 5x 5.25 x 1.5 inches
Standalone/ Board	Standalone	Standalone
Interface	–	–
Price	£125, £158 and £243	£125, £158 and £243
Printer Buffer	Dial-Text 50	BIF 1110, 11, 12 and 13
Manufacturer/ Supplier	Duplex Communications	IBEK Systems
Memory	16K	8K, 16K, 48K and 96K
Specifications	RS 232 C – RS 232 C	IEEE – IEEE
Features	Connects to an acoustic coupler and can transmit text over the telephone line to remote printers (via another dial-text unit) Error detection and correction Stores messages on cassette unit Requires a RS 232 C printer	Secondary addressing Scheduled to be ready beginning of May
Standalone/ Board	Standalone	Standalone
Interface	Pet: IEEE converter CBM 64: RS 232 level converter	–
Price	£495	£199, £219, £249 and £289
Printer Buffer	BIF2220,21,22 and 23	BIF2210,11,12 and 13
Manufacturer/ Supplier	IBEK Systems	IBEK Systems
Memory	8K, 16K, 32K and 64K	8K, 16K, 32K and 64K
Specifications	Parallel – Epson Printer	Parallel – parallel
Features	Specifically for the Epson printers and fits into a slot inside	–
Standalone/ Board	Board	Standalone
Interface	Requires CBM64/VIC20 to Parallel interface. IBEC price for IF4210: £59.95	Requires CBM64/VIC20 to parallel interface. IBEC price for IF4210: £59.95
Price	£59.95, £69.95, £79.95 and £109.95	£79.95, £89.95, £99.95 and £129.95

Printer Buffer	Super Spooler E/Buffer	Sprint Buffer
Manufacturer/ Supplier	A-Line Computer Systems	A-Line Computer Systems
Memory	16K, 32K and 64K	65K
Specifications	IEEE – Epson printer	IEEE – IEEE, Parallel and RS 232 C versions
Features	Designed to fit any of the Epson printers: MX, RX and FX Allows use of printer lower case characters	Self Test Dimensions: 11.7 x 8 x 4 inches
Standalone/ Board	Board	Standalone
Interface	–	–
Price	£105, £135 and £185	£350 for IEEE – IEEE £368 for IEEE – RS 232 C and Parallel versions

Printer Buffer	TAII	Spriinter
Manufacturer/ Supplier	A-Line Computer Systems	A-Line Computer Systems
Memory	64K	2K, 16K and 32K
Specification	IEEE-IEEE	IEEE – IEEE, Parallel or RS 232 C.
Features	Unidirectional Reset and pause control	6 ports Compatible with RS 232 C, Parallel or IEEE printers Dimensions: 30cm x 20cm x 9.5cm
Standalone/ Board	Standalone	Standalone
Interface	–	–
Price	£350	£175, 195 and £245

Printer Buffer	TAIRS	TAIP
Manufacturer/ Supplier	A-Line Computer Systems	A-Line Computer Systems
Memory	63K	64K
Specification	IEEE – RS 232 C	IEEE – Parallel Centronic
Features	Unidirectional Pause and reset controls Compatible with RS 232 printer 31K: Storage on input and output	Pause and reset controls
Standalone/ Board	Standalone	Standalone
Interface	–	–
Price	£350	£368

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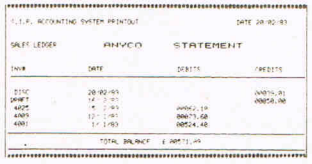

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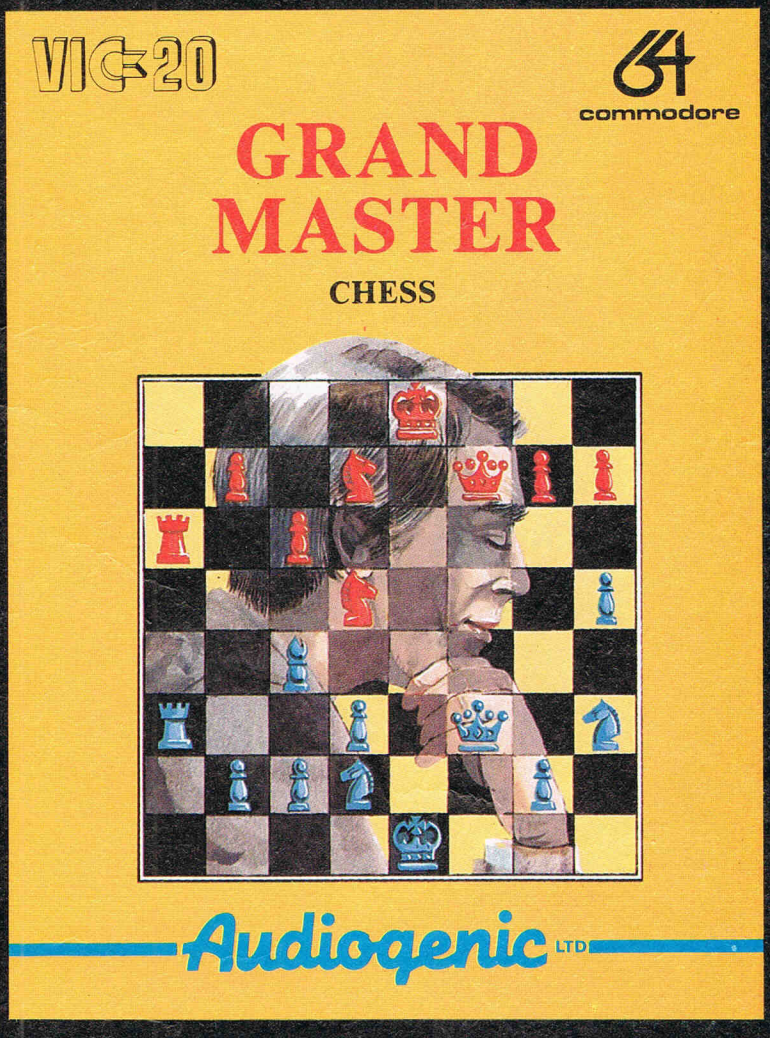

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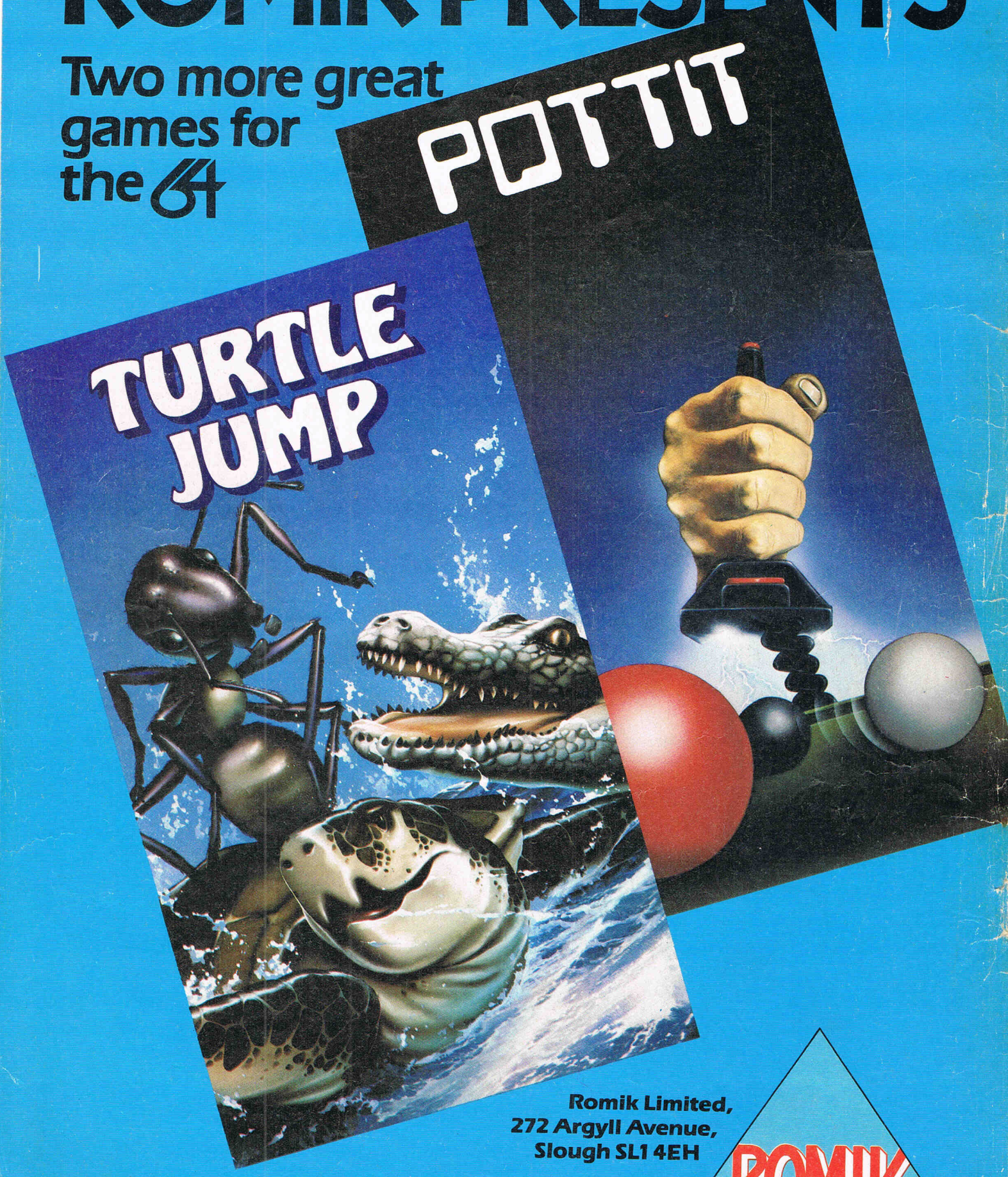

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